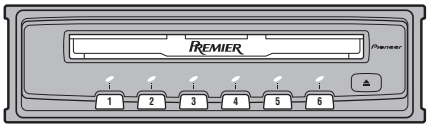
Pioneer

# Service Manual



ORDER NO.
**CRT2372**

MULTI-COMPACT DISC PLAYER

# CDX-PD6

UC

COMPACT disc DIGITAL AUDIO

- **See the separate manual CX-890(CRT2376) for the CD mechanism description, disassembly and circuit description.**
- **The CD mechanism employed in this model is one of G1 series.**

## CONTENTS


1. SAFETY INFORMATION .....2
2. EXPLODED VIEWS AND PARTS LIST .....3
3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM ...10
4. PCB CONNECTION DIAGRAM .....26
5. ELECTRICAL PARTS LIST .....42
6. ADJUSTMENT.....46
7. GENERAL INFORMATION .....48
   7.1 DIAGNOSIS .....48
      7.1.1 TEST MODE .....48
      7.1.2 DISASSEMBLY .....55
   7.2 IC .....58
8. OPERATIONS AND SPECIFICATIONS.....63



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### ● CD Player Service Precautions

1. For pickup unit(CXX1311) handling, please refer to"Disassembly"(see page 55).
   During replacement, handling precautions shall be taken to prevent an electrostatic discharge(protection by a short pin).

2. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.
3. Please checking the grating after changing the service pickup unit(see page 46).

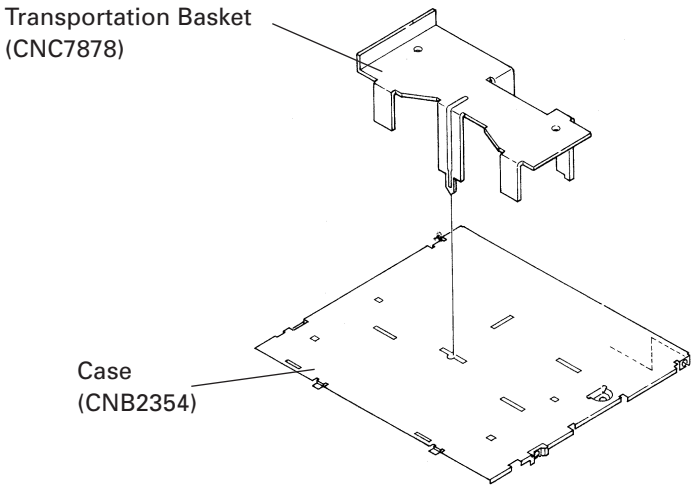
### ● When the Repair is Complete

When the repair is complete, make the CD mechanism ready for transportation
implementing the following procedures:

1. Press the changer side 1 and 4 simultaneously to turn the ACC on.
2. As the ACC is turned on, the disc indicator blinks in red.

3. When the blinking is stopped, the mechanism is ready for the transportation.

4. Attach the Transportation Bracket (CNC7878). Now you can transport it.(See the figure below) (The Bracket used on the CDX-PD6/UC is recommended for the transportation purpose.)




# 1. SAFETY INFORMATION

**CAUTION**

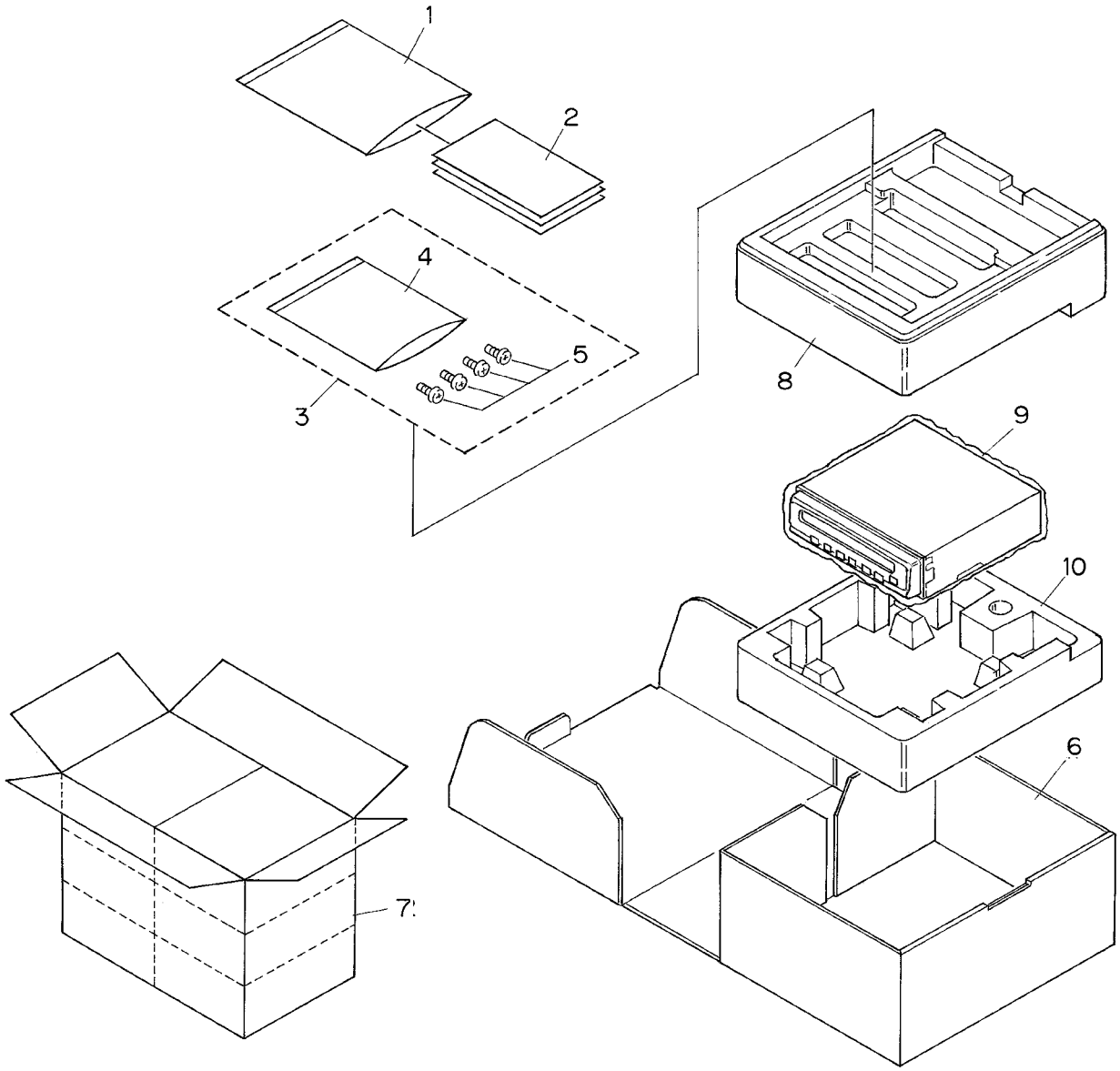
This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty.
If you are not qualified to perform the repair of this product properly and safely; you should not risk trying to do so and refer the repair to a qualified service technician.

**WARNING**

This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.
Health & Safety Code Section 25249.6 - Proposition 65

# 2. EXPLODED VIEWS AND PARTS LIST

## 2.1 PACKING



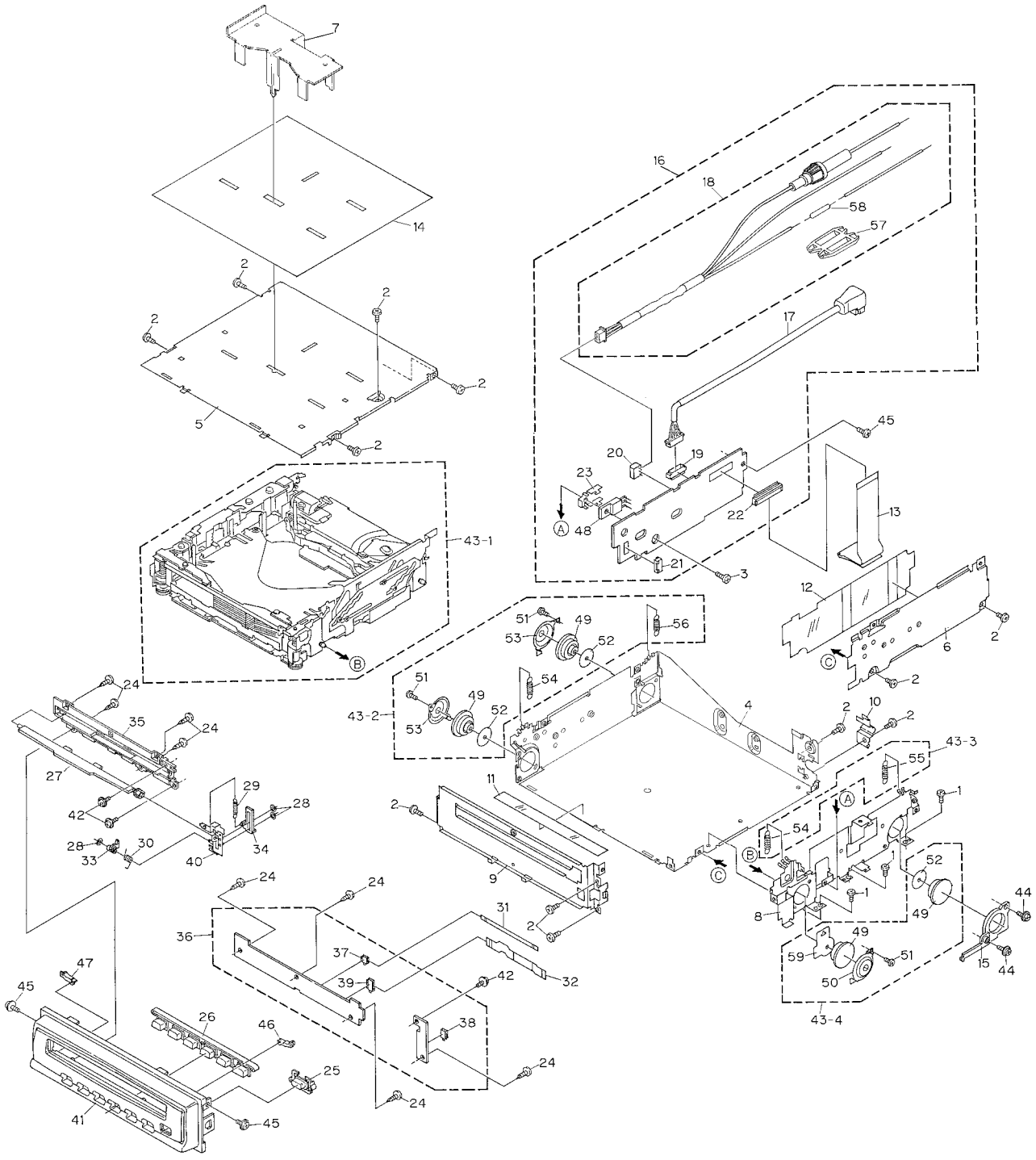

**NOTE:**

- Parts marked by "*" are generally unavailable because they are not in our Master Spare Parts List.
- Screws adjacent to ∇ mark on the product are used for disassembly.

**● PACKING SECTION PARTS LIST**

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1 | Polyethylene Bag | CEG1116 |
| | 2-1 | Owner's Manual (English, French) | CRD3000 |
| | 2-2 | Installation Manual (English, French) | CRD3001 |
| * | 2-3 | Warranty Card | CRY1070 |
| | 3 | Screw Assy | CEA2046 |
| * | 4 | Polyethylene Bag | CEG-127 |
| | 5 | Screw | BMZ50P080FMC |
| | 6 | Carton | CHG3787 |
| | 7 | Contain Box | CHL3787 |
| | 8 | Protector | CHP2123 |
| | 9 | Cover | CEG1177 |
| | 10 | Protector | CHP2124 |

## 2.2 EXTERIOR

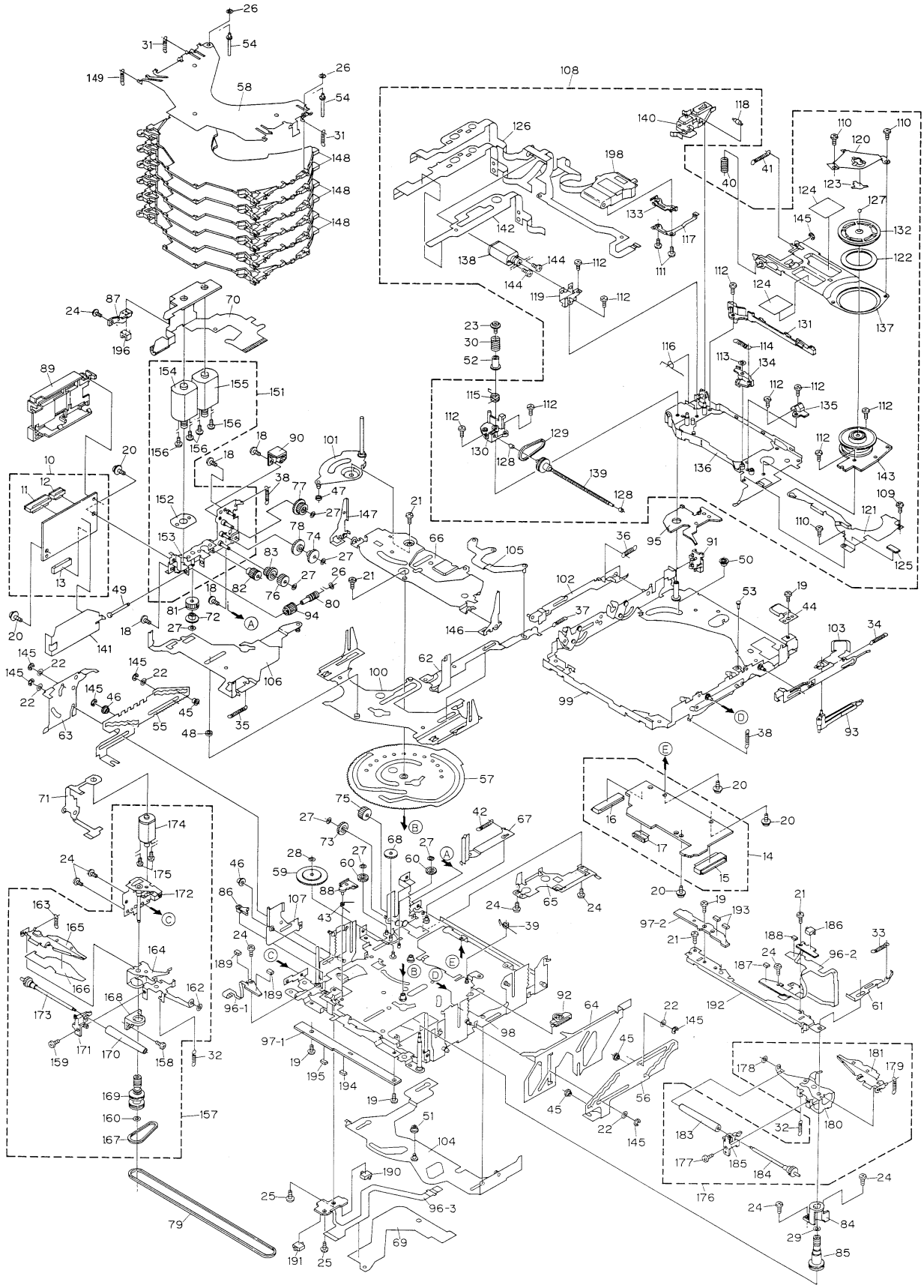


## ● EXTERIOR SECTION PARTS LIST

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1 | Screw | BMZ20P020FMC |
| | 2 | Screw | BMZ26P030FMC |
| | 3 | Screw | BMZ26P060FMC |
| | 4 | Chassis | CNA2178 |
| | 5 | Case | CNB2354 |
| | 6 | Side Frame | CNB2484 |
| | 7 | Bracket | CNC7878 |
| | 8 | Bracket | CNC8026 |
| | 9 | Front Frame | CNC8027 |
| | 10 | Holder | CNC8028 |
| | 11 | Insulator | CNM5969 |
| | 12 | Insulator | CNM5970 |
| | 13 | PCB | CNP5516 |
| * | 14 | Caution Label | CRP1200 |
| | 15 | Holder | CNV5543 |
| | 16 | Extended Unit | CWM6526 |
| | 17 | Cord | CDE6020 |
| | 18 | Cord | CDE6019 |
| | 19 | Connector(CN102) | CKS2200 |
| | 20 | Connector(CN103) | CKS3597 |
| | 21 | Connector(CN701) | CKS3970 |
| | 22 | Connector(CN101) | CKS3989 |
| | 23 | Holder | CNC8031 |
| | 24 | Screw | BPZ20P060FMC |
| | 25 | Button(EJECT) | CAC5821 |
| | 26 | Button(1-6) | CAC6115 |
| | 27 | Door | CAT2067 |
| | 28 | Washer | CBF1038 |
| | 29 | Spring | CBH2200 |
| | 30 | Spring | CBH2201 |

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 31 | Connector | CDE5858 |
| | 32 | PCB | CNP5281 |
| | 33 | Gear | CNV5547 |
| | 34 | Arm | CNV5548 |
| | 35 | Guide | CNV5818 |
| | 36 | Keyboard Unit | CWM6131 |
| | 37 | Connector(CN902) | CKS3992 |
| | 38 | Connector(CN903) | CKS3992 |
| | 39 | Connector(CN901) | CKS4053 |
| | 40 | Bracket Unit | CXB3111 |
| | 41 | Grille Unit | CXB4000 |
| | 42 | Screw | IMS20P040FMC |
| | 43 | CD Mechanism Module | CXK4701 |
| | 44 | Screw | IMS20P040FMC |
| | 45 | Screw | IMS26P040FMC |
| * | 46 | Lighting Conductor | CNV5546 |
| * | 47 | Lighting Conductor | CNV5545 |
| | 48 | Transistor(Q708) | 2SB1335A |
| | 49 | Damper | CNV5120 |
| | 50 | Holder | CNC7826 |
| | 51 | Screw(M2x2) | CBA1250 |
| | 52 | Sheet | CNM5981 |
| | 53 | Holder | CNC7477 |
| | 54 | Spring(Front) | CBH2066 |
| | 55 | Spring(Right Rear)(Black) | CBH2067 |
| | 56 | Spring(Left Rear) | CBH2065 |
| | 57 | Cap | CNS1472 |
| | 58 | Resistor | RS1/2PMF102J |
| | 59 | Sheet | CNM6318 |

## 2.3 CD MECHANISM



## ● CD MECHANISM SECTION PARTS LIST

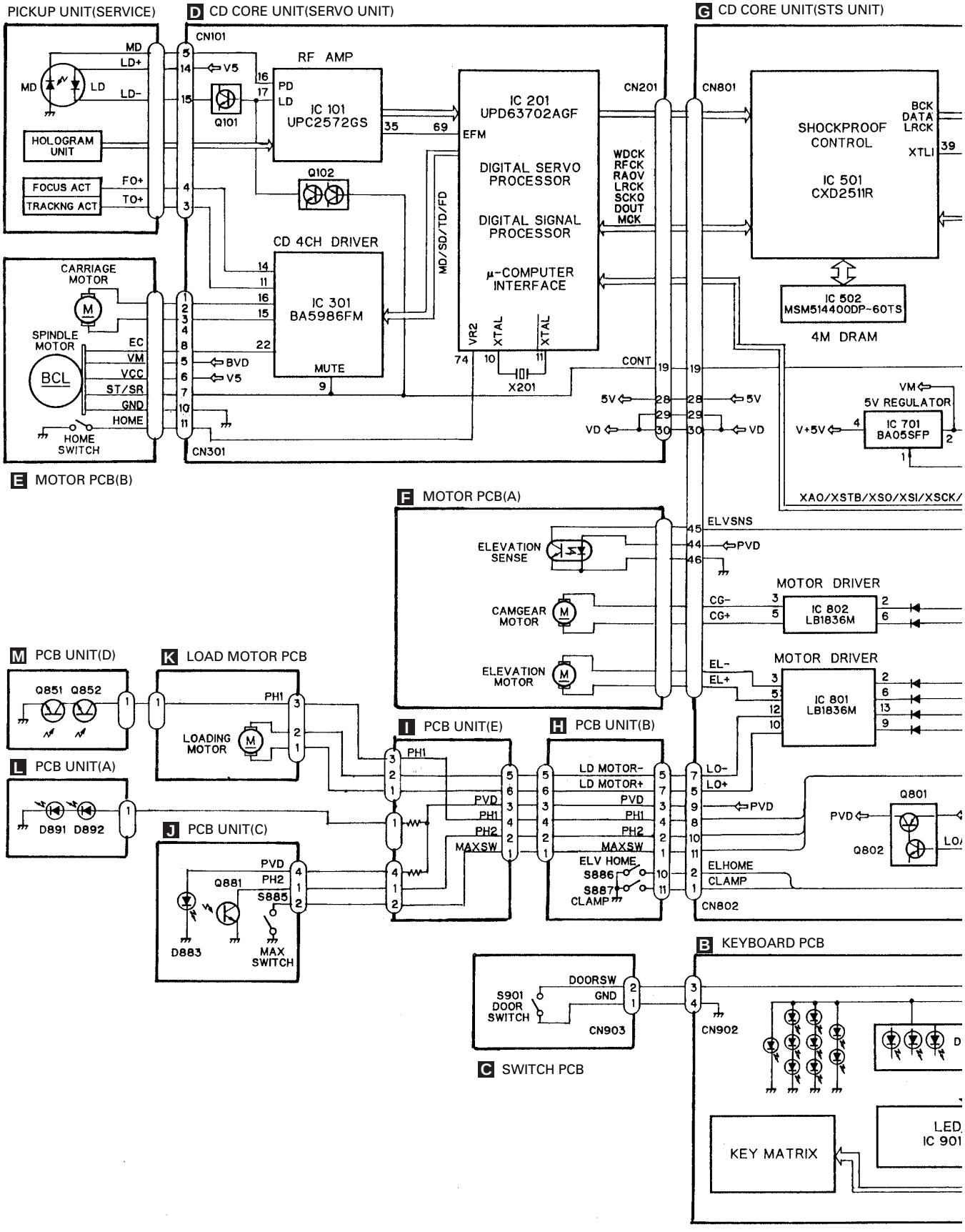
| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1-9 | ••••• | |
| | 10 | CD Core Unit(Servo Unit) | CWX2202 |
| | 11 | Connector(CN101) | CKS2764 |
| | 12 | Connector(CN301) | CKS3966 |
| | 13 | Connector(CN201) | CKS3991 |
| | 14 | CD Core Unit(STS Unit) | CWX2203 |
| | 15 | Connector(CN701) | CKS3989 |
| | 16 | Connector(CN801) | CKS3989 |
| | 17 | Connector(CN802) | CKS4054 |
| | 18 | Screw | CBA1037 |
| | 19 | Screw | CBA1041 |
| | 20 | Screw | CBA1076 |
| | 21 | Screw | CBA1250 |
| | 22 | Screw | CBA1405 |
| | 23 | Screw | CBA1452 |
| | 24 | Screw | CBA1453 |
| | 25 | Screw | CBA1479 |
| | 26 | Washer | CBF1037 |
| | 27 | Washer | CBF1038 |
| | 28 | Washer | CBF1039 |
| | 29 | Washer | CBF1064 |
| | 30 | Spring | CBH2007 |
| | 31 | Spring | CBH2011 |
| | 32 | Spring | CBH2013 |
| | 33 | Spring | CBH2014 |
| | 34 | Spring | CBH2015 |
| | 35 | Spring | CBH2016 |
| | 36 | Spring | CBH2017 |
| | 37 | Spring | CBH2290 |
| | 38 | Spring | CBH2019 |
| | 39 | Spring | CBH2064 |
| | 40 | Spring | CBH2195 |
| | 41 | Spring | CBH2196 |
| | 42 | Spring | CBH2224 |
| | 43 | Spring | CBH2250 |
| | 44 | Spring | CBL1328 |
| | 45 | Roller | CLA3154 |
| | 46 | Roller | CLA3157 |
| | 47 | Roller | CLA3159 |
| | 48 | Roller | CLA3160 |
| | 49 | Shaft | CLA3179 |
| | 50 | Spacer | CLA3194 |
| | 51 | Roller | CLA3248 |
| | 52 | Bush | CLA3353 |
| * | 53 | Shaft | CLA3469 |
| | 54 | Shaft | CLA3543 |
| | 55 | Steer | CNC7215 |
| | 56 | Steer | CNC7216 |
| | 57 | Cam | CNC7227 |
| * | 58 | Holder | CNC7235 |
| | 59 | Gear | CNC7236 |
| | 60 | Gear | CNC7238 |
| | 61 | Lever | CNC7243 |
| | 62 | Lever | CNC7244 |
| | 63 | Lever | CNC7245 |
| | 64 | Lever | CNC7246 |
| | 65 | Cover | CNC7441 |
| | 66 | Holder | CNC8451 |
| | 67 | Lever | CNC8024 |
| | 68 | Gear | CNC8140 |
| | 69 | Sheet | CNM5831 |
| | 70 | PCB | CNP4839 |
| | 71 | PCB | CNP5259 |
| | 72 | Gear | CNR1479 |
| | 73 | Gear | CNR1481 |
| | 74 | Gear | CNR1495 |
| | 75 | Gear | CNR1501 |
| | 76 | Gear | CNR1502 |
| | 77 | Gear | CNR1540 |
| | 78 | Gear | CNR1541 |
| | 79 | Belt | CNT1080 |
| | 80 | Worm Gear | CNV5046 |
| | 81 | Gear | CNV5047 |
| | 82 | Gear | CNV5048 |
| | 83 | Gear | CNV5049 |
| | 84 | Holder | CNV5056 |
| | 85 | Pulley | CNV5058 |
| | 86 | Arm | CNV5061 |
| | 87 | Spacer | CNV5066 |
| | 88 | Arm | CNV5189 |
| | 89 | Cover | CNV5207 |
| | 90 | Cover | CNV5424 |
| | 91 | Cover | CNV5425 |
| | 92 | Lever | CNV5427 |
| | 93 | Arm | CNV5491 |
| | 94 | Gear | CNV5519 |
| | 95 | Holder | CNV5648 |
| | 96 | Composite PCB | CNX3141 |
| | 97 | Composite PCB | CNX2989 |
| | 98 | Chassis Unit | CXB4314 |

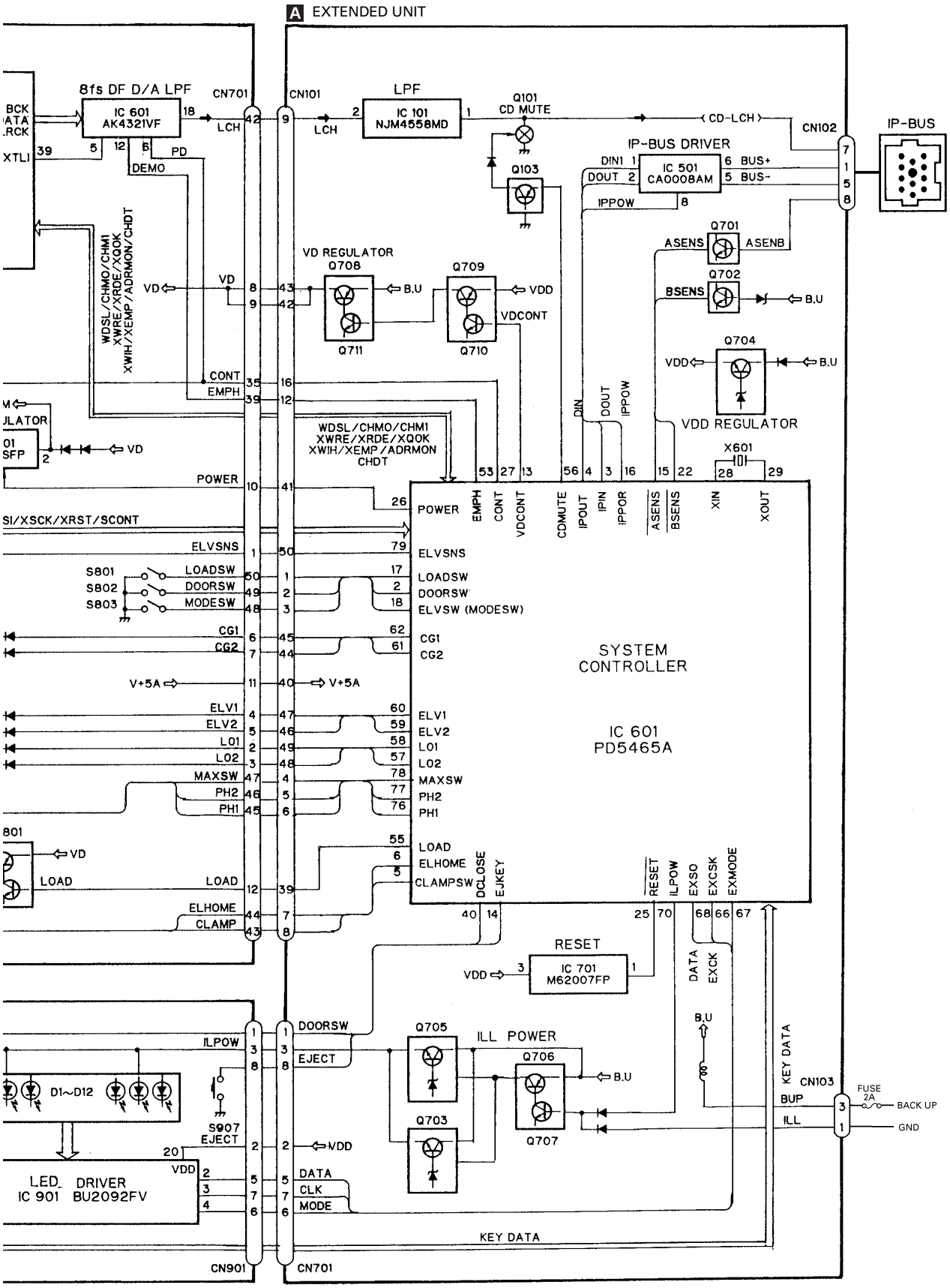
| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 99 | Frame Unit | CXB2702 |
| | 100 | Lever Unit | CXB2703 |
| | 101 | Arm Unit | CXB2704 |
| | 102 | Lever Unit | CXB2708 |
| | 103 | Lever Unit | CXB2709 |
| | 104 | Lever Unit | CXB2711 |
| | 105 | Arm Unit | CXB2712 |
| | 106 | Lever Unit | CXB2713 |
| | 107 | Lever Unit | CXB2714 |
| | 108 | Carriage Mechanism Unit(G1) | CXB2998 |
| | 109 | Screw | CBA1041 |
| | 110 | Screw | CBA1250 |
| | 111 | Screw | CBA1362 |
| | 112 | Screw | CBA1471 |
| | 113 | Washer | CBF1038 |
| | 114 | Spring | CBH2008 |
| | 115 | Spring | CBH2009 |
| | 116 | Spring | CBH2010 |
| | 117 | Spring | CBL1335 |
| | 118 | Roller | CLA3173 |
| * | 119 | Bracket | CNC7228 |
| | 120 | Guide Unit | CXB4417 |
| | 121 | Cover | CNC7628 |
| | 122 | Sheet | CNM6414 |
| | 123 | Sheet | CNM5378 |
| | 124 | Sheet | CNM5695 |
| | 125 | Sheet | CNM5827 |
| | 126 | PCB | CNP4978 |
| | 127 | Ball | CNR1189 |
| | 128 | Bearing | CNR1423 |
| | 129 | Belt | CNT1079 |
| | 130 | Holder | CNV5037 |
| | 131 | Guide | CNV5040 |
| | 132 | Clamper | CNV5042 |
| | 133 | Rack | CNV5111 |
| | 134 | Arm | CNV5579 |
| | 135 | Holder | CNV5759 |
| * | 136 | Chassis | CXB2698 |
| | 137 | Arm Unit | CXB2705 |
| | 138 | Motor Unit(M4 CARRIAGE) | CXB3178 |
| | 139 | Screw Unit | CXB3179 |
| | 140 | Lever Unit | CXB4291 |
| | 141 | Insulator | CNM6306 |
| | 142 | Spacer | CNM6294 |
| | 143 | Motor(M5 SPINDLE) | CXM1120 |
| | 144 | Screw | JFZ14P020FMC |
| | 145 | Washer | YE15FUC |
| | 146 | Arm Unit | CXB4289 |
| | 147 | Arm Unit | CXB4290 |
| | 148 | Tray Assy | CXB4307 |

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 149 | Spring | CBH2269 |
| | 150 | ••••• | |
| | 151 | Cam Motor Assy | CXB3170 |
| | 152 | Spacer | CNC8289 |
| * | 153 | Bracket Unit | CXB4165 |
| * | 154 | Motor Unit(M1 Cam Gear) | CXB3174 |
| * | 155 | Motor Unit(M3 ELV) | CXB3175 |
| | 156 | Screw | JFZ20P025FMC |
| | 157 | Loading Arm L Assy | CXB3171 |
| | 158 | Screw | CBA1250 |
| | 159 | Screw | CBA1453 |
| | 160 | Washer | CBF1038 |
| | 161 | ••••• | |
| | 162 | Washer | CBF1074 |
| | 163 | Spring | CBH2136 |
| * | 164 | Arm | CNC7241 |
| * | 165 | Arm | CNC7827 |
| * | 166 | Sheet | CNM5691 |
| | 167 | Belt | CNT1079 |
| | 168 | Holder | CNV5055 |
| | 169 | Pulley | CNV5057 |
| | 170 | Roller | CNV5064 |
| | 171 | Guide | CNV5125 |
| * | 172 | Bracket Unit | CXB4316 |
| | 173 | Roller Gear Unit | CXB3176 |
| | 174 | Motor Unit(M2 LOAD) | CXB3177 |
| | 175 | Screw | JFZ14P020FMC |
| | 176 | Loading Arm R Assy | CXB3172 |
| | 177 | Screw | CBA1453 |
| | 178 | Washer | CBF1074 |
| | 179 | Spring | CBH2136 |
| * | 180 | Arm | CNC7242 |
| * | 181 | Arm | CXB4448 |
| | 182 | ••••• | |
| | 183 | Roller | CNV5064 |
| | 184 | Roller Gear Unit | CXB3176 |
| | 185 | Guide | CNV5126 |
| | 186 | Switch(S885 MAX) | CSN1052 |
| | 187 | LED(D883) | CL202IRXTU |
| | 188 | Photo-transistor(Q881) | CPT231SXTD |
| | 189 | LED(D891,892) | CL202IRXTU |
| | 190 | Switch(S887 CLAMP) | CSN1051 |
| | 191 | Switch(S886 ELV HOME) | CSN1052 |
| | 192 | Bracket Unit | CXB4306 |
| | 193 | Photo-transistor(Q851,852) | CPT231SXTD |
| | 194 | Resistor(R856) | RS1/8S911J |
| | 195 | Resistor(R857) | RS1/8S821J |
| | 196 | Photo-interrupter(Q1) | RPI-221 |
| | 197 | ••••• | |
| | 198 | Pickup Unit(Service)(P8) | CXX1311 |

# 3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

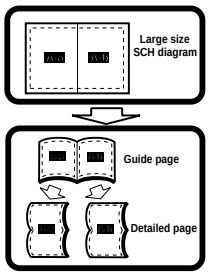
## 3.1 BLOCK DIAGRAM




A EXTENDED UNIT
8fs DF D/A LPF
IC 601
AK4321VF
CN701
CN101
LPF
IC 101
NJM4558MD
Q101
CD MUTE
CD-LCH
CN102
IP-BUS
IP-BUS DRIVER
IC 501
CA0008AM
BUS+
BUS-
IPPOW
Q103
Q701
ASENS
ASENB
Q702
BSENS
B.U
Q704
VDD REGULATOR
VD REGULATOR
Q708
Q709
Q711
Q710
VDCONT
VD
LCH
PD
DEMO
XTLI
WDSL/CHMO/CHM1
XWRE/XRDE/XQOK
XWIH/XEMP/ADRMON/CHDT
CONT
EMPH
POWER
DIN
DOUT
IPPOW
X601
SYSTEM
CONTROLLER
IC 601
PD5465A
ELVSNS
LOADSW
DOORSW
ELVSW (MODESW)
S801
S802
S803
CG1
CG2
V+5A
ELV1
ELV2
L01
L02
MAXSW
PH2
PH1
LOAD
ELHOME
CLAMP
CLAMPSW
DCLOSE
EJKEY
RESET
ILPOW
EXSO
EXCSK
EXMODE
IC 701
M62007FP
DATA
EXCK
DOORSW
EJECT
ILL POWER
Q705
Q706
Q707
Q703
KEY DATA
CN103
BUP
ILL
FUSE
2A
BACK UP
GND
D1~D12
S907
EJECT
LED DRIVER
IC 901 BU2092FV
CLK
MODE
CN901
CN701

## 3.2 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

**Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".**




A-a

G CD CORE UNIT(STS UNIT)

SYSTEM CONTROLLER

PD5465A

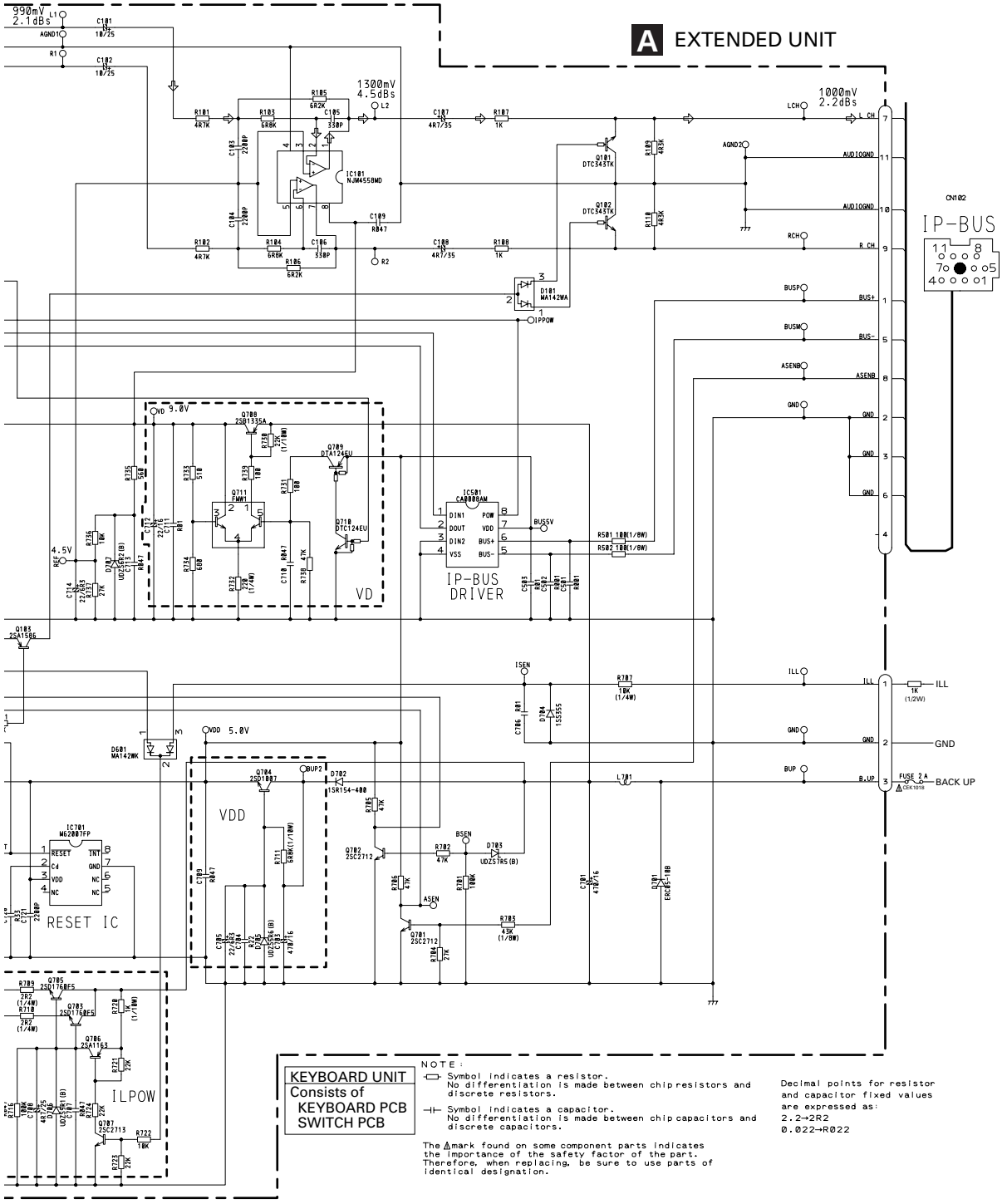
LED DRIVER

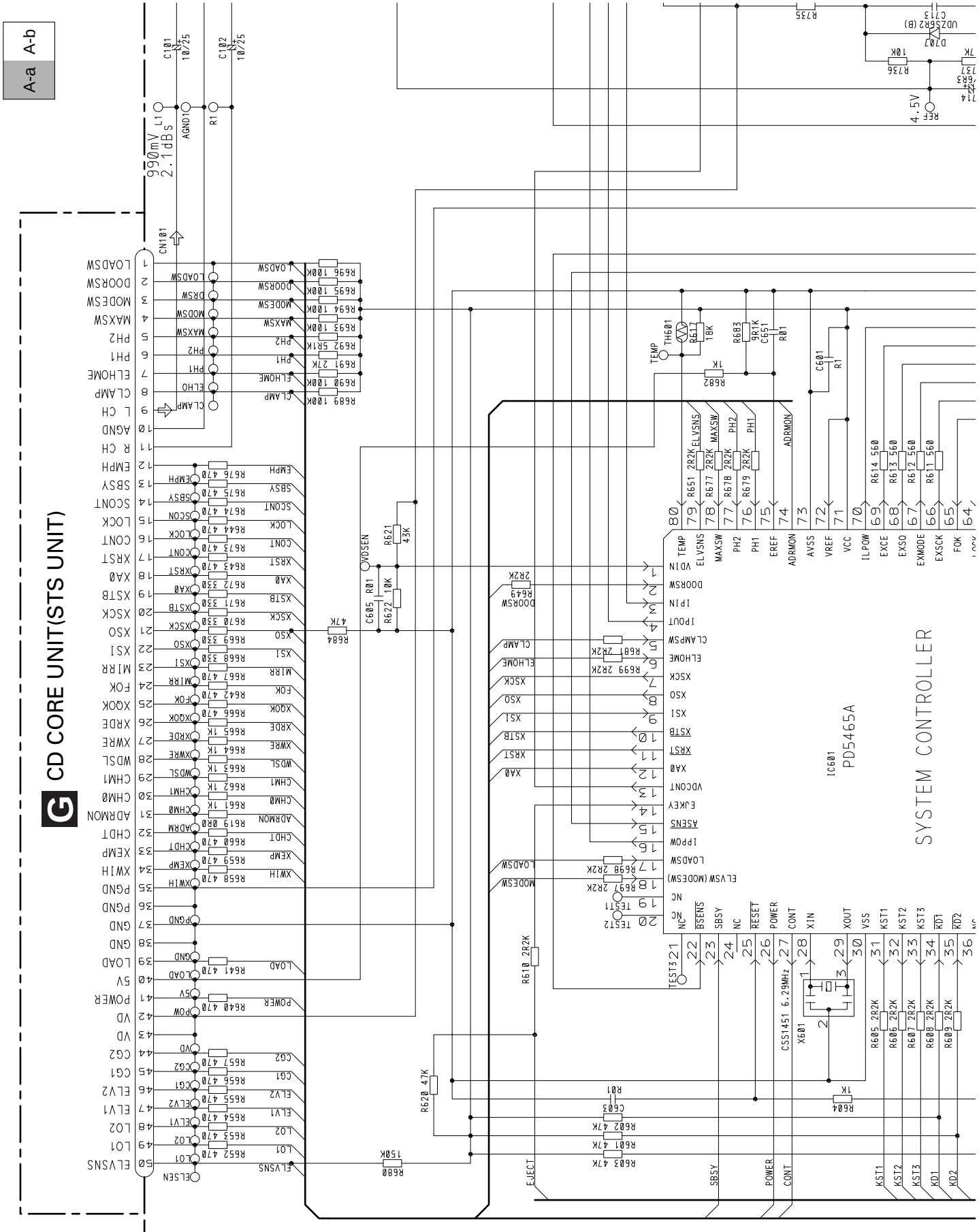
DOOR SWITCH

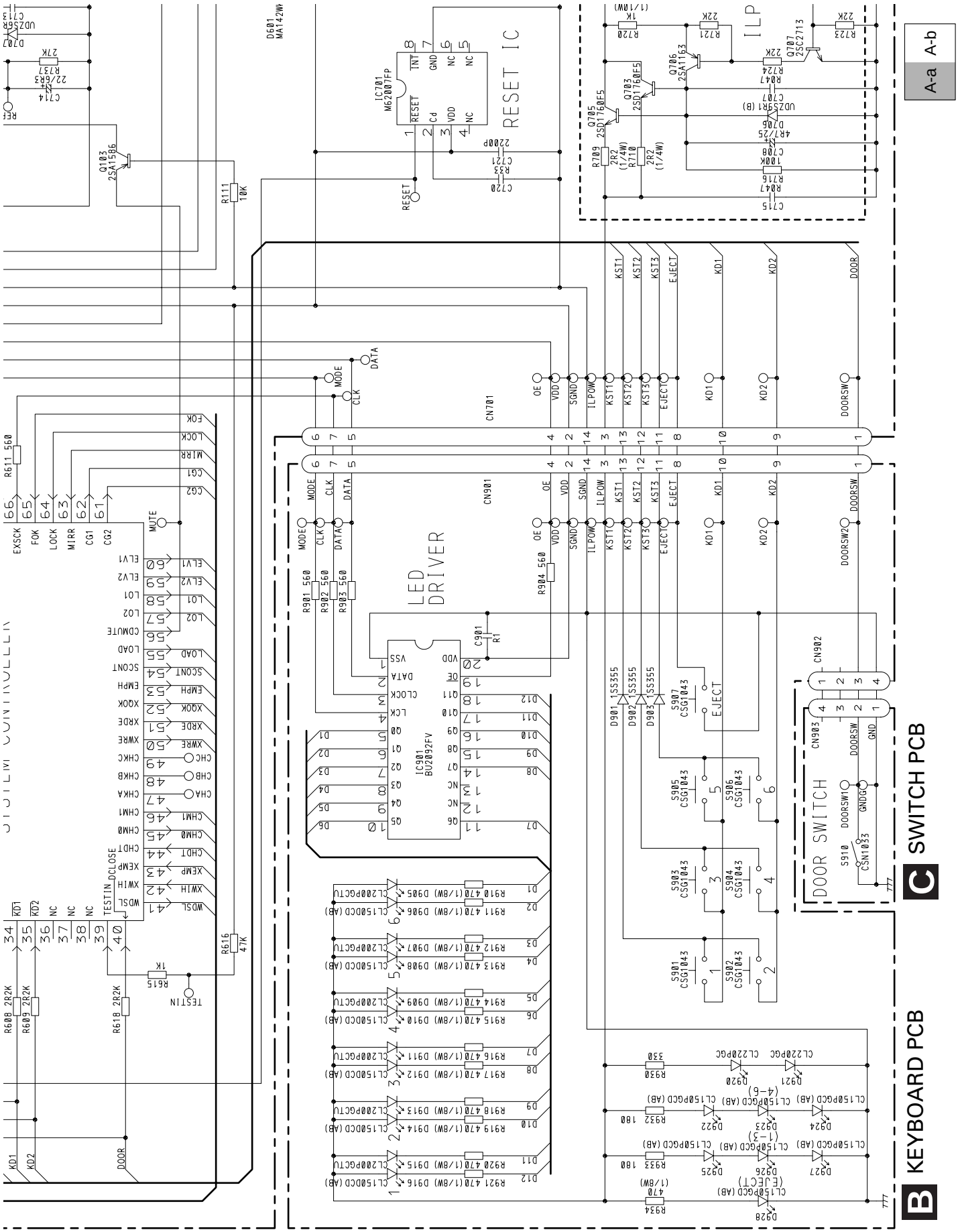
B KEYBOARD PCB

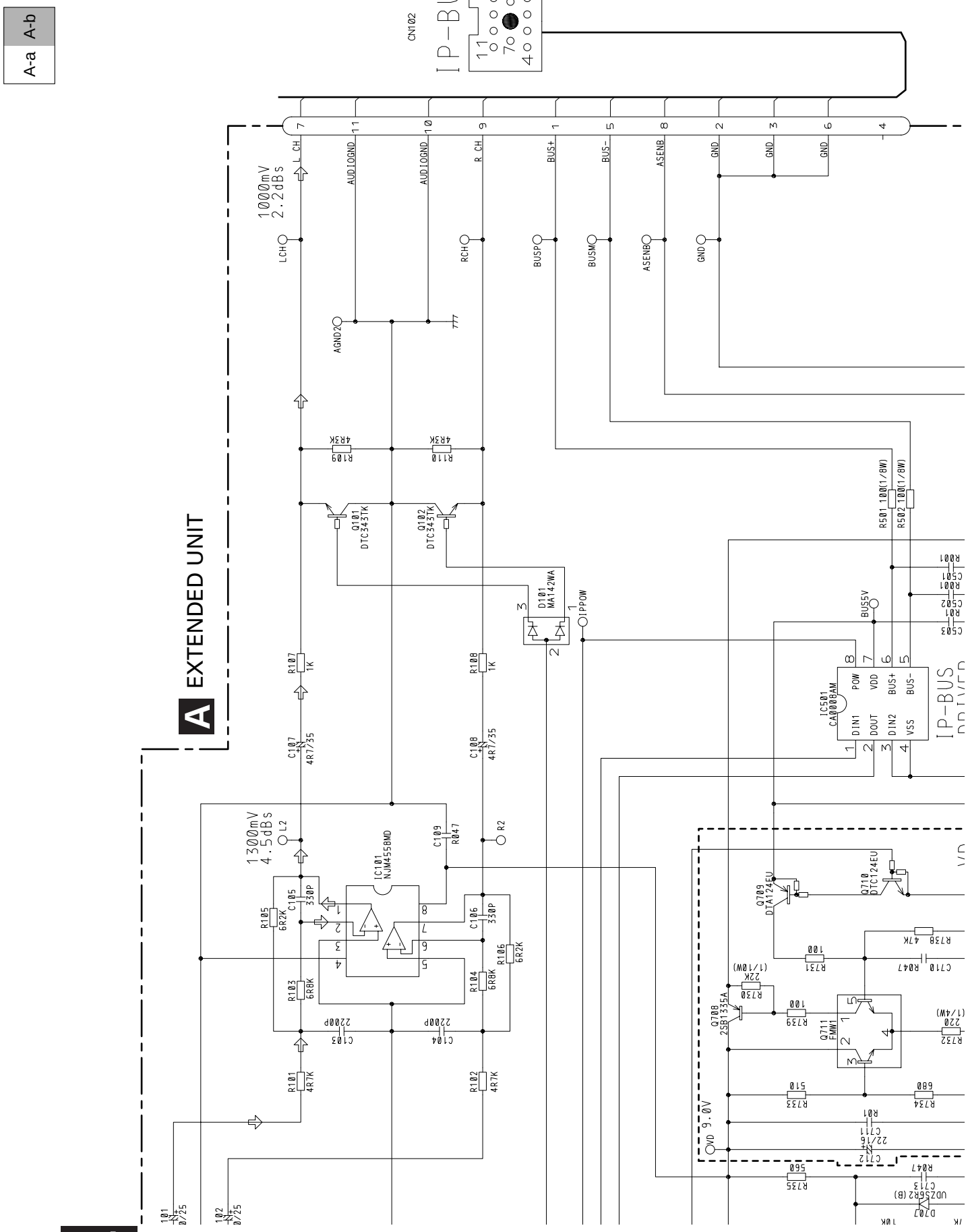
C SWITCH PCB

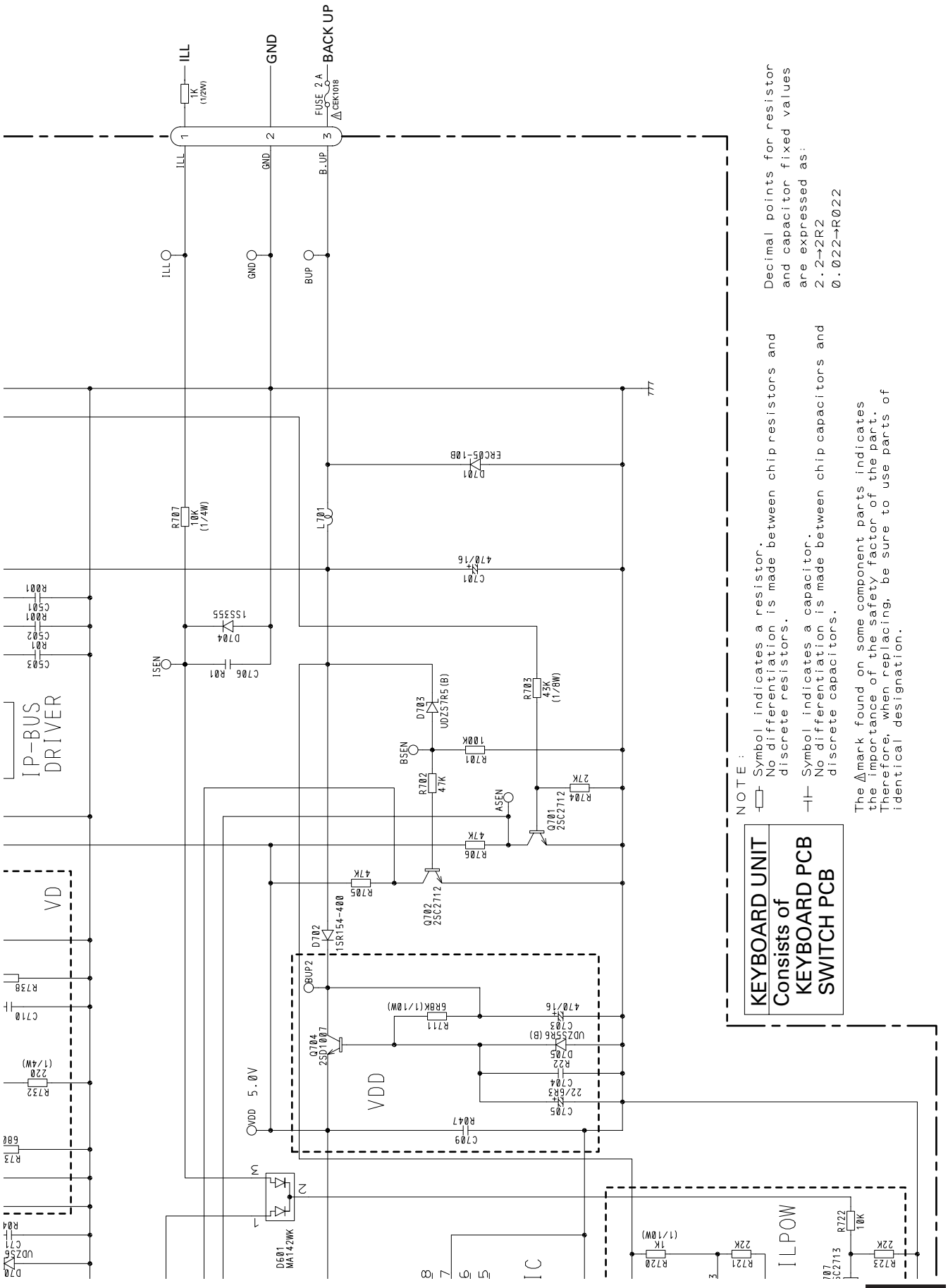
# A-b


A EXTENDED UNIT
990mV
2.1dBs
1300mV
4.5dBs
1000mV
2.2dBs
IC101
NJM4558MD
Q101
DTC345TK
Q102
DTC345TK
D101
MA142WA
CN102
IP-BUS
IC501
CAR008AM
IP-BUS
DRIVER
VD
9.0V
Q708
2SB1335A
Q709
DTA124EU
Q710
DTC124EU
Q711
FW01
IC701
M62007FP
RESET IC
VDD
5.0V
Q704
2SD1807
D702
1SR154-400
Q702
2SC2712
Q701
2SC2712
D703
UDZ5TR5(B)
Q705
2SD1760EF5
Q703
2SD1760EF5
Q706
2SA1163
ILPOW
Q707
2SC2713
Q103
2SA1586
D601
MA142WK
L701
D704
1SS355
R707
1K
(1/2W)
ILL
GND
BACK UP
FUSE 2A
BUS5V
IPPOW
BSEN
ASEN
ISEN
LCH
RCH
AGND2
AUDIOGND
BUSP
BUSM
ASENB
GND
BUP
L CH
R CH
BUS+
BUS-
ASENB
GND
B.UP
KEYBOARD UNIT
Consists of
KEYBOARD PCB
SWITCH PCB
NOTE :
Symbol indicates a resistor.
No differentiation is made between chip resistors and discrete resistors.
Symbol indicates a capacitor.
No differentiation is made between chip capacitors and discrete capacitors.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part.
Therefore, when replacing, be sure to use parts of identical designation.
Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022


A-b
A-a
G CD CORE UNIT(STS UNIT)
SYSTEM CONTROLLER
IC601
PD5465A
CN101
LOADSW
DOORSW
MODESW
MAXSW
PH2
PH1
ELHOME
CLAMP
L CH
AGND
R CH
EMPH
SBSY
SCONT
LOCK
CONT
XRST
XA0
XSTB
XSCK
XSO
XSI
MIRR
FOK
XGOK
XRDE
XWRE
WDSL
CHM1
CHM0
ADRMON
CHDT
XEMP
XWIH
PGND
GND
LOAD
5V
POWER
VD
CG2
CG1
ELV2
ELV1
LO2
LO1
ELVSNS
990mV 2.1dBs
C101 10/25
C102 10/25
R1
AGND1
L1
REF 4.5V
TEMP
TH601
R617 18K
R682 1K
R683 9R1K
C651 R01
C601 R1
R614 560
R613 560
R612 560
R611 560
R735
D703 UDZSR2 (B)
R736 10K
C713 7K
R714 6R3
R621 43K
C605 R01
R622 10K
VDSEN
R684 47K
R620 47K
R680 150K
R610 2R2K
C603 R01
R602 47K
R601 47K
R603 47K
R604 1K
X601 CSS1451 6.29MHz
R605 2R2K
R606 2R2K
R607 2R2K
R608 2R2K
R609 2R2K
TEST1
TEST2
TEST3
EJECT
SBSY
POWER
CONT
KST1
KST2
KST3
KD1
KD2


RESET IC
LED DRIVER
ILP
DOOR SWITCH
EJECT
A-b
A-a
C SWITCH PCB
B KEYBOARD PCB

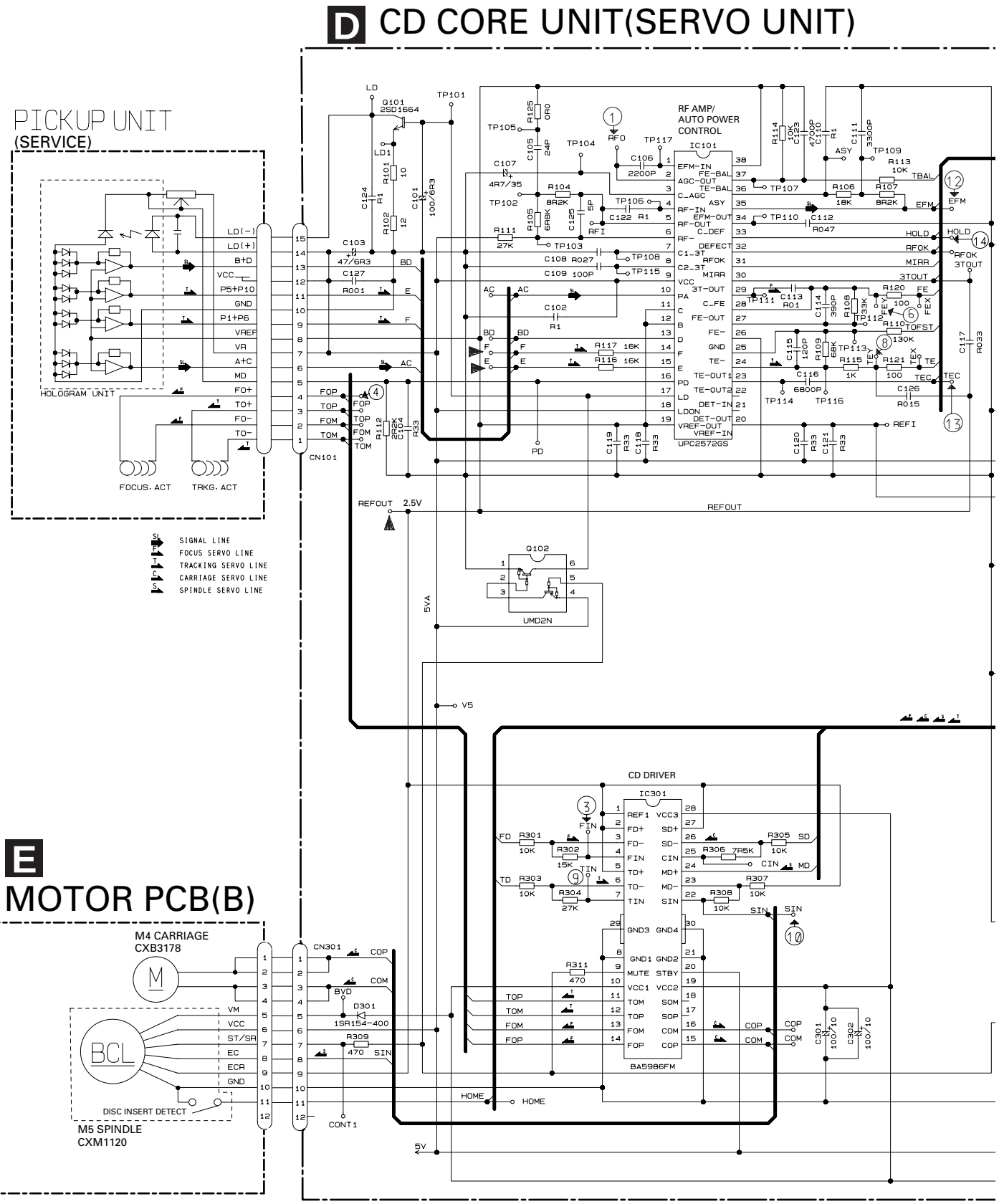

A-b
A-a
CN102
IP-BUS
L CH
AUDIOGND
AUDIOGND
R CH
BUS+
BUS-
ASENB
GND
GND
GND
1000mV
2.2dBs
LCH
RCH
BUSP
BUSM
ASENB
GND
AGND2
EXTENDED UNIT
Q101 DTC343TK
Q102 DTC343TK
D101 MA142WA
IPPOW
R501 100Ω(1/8W)
R502 100Ω(1/8W)
BUS5V
IC501 CA0008AM
POW
VDD
BUS+
BUS-
DIN1
DOUT
DIN2
VSS
IP-BUS
R107 1K
R108 1K
C107 4R7/35
C108 4R7/35
1300mV
4.5dBs
L2
R2
IC101 NJM4558MD
C109 R047
R105 6R2K
C105 330P
C106 330P
R106 6R2K
R103 6R8K
R104 6R8K
C103 220P
C104 220P
R101 4R7K
R102 4R7K
Q709 DTA124EU
Q710 DTC124EU
R738 47K
R731 100
C710 R047 (1/10W)
R730 22K
R739 100
Q708 2SB1335A
Q711 FMW1
R732 220 (1/4W)
R733 510
R734 680
VD 9.0V
C711 22/16
C712
R735 560
C713 UDZS6R2 (B)
D703

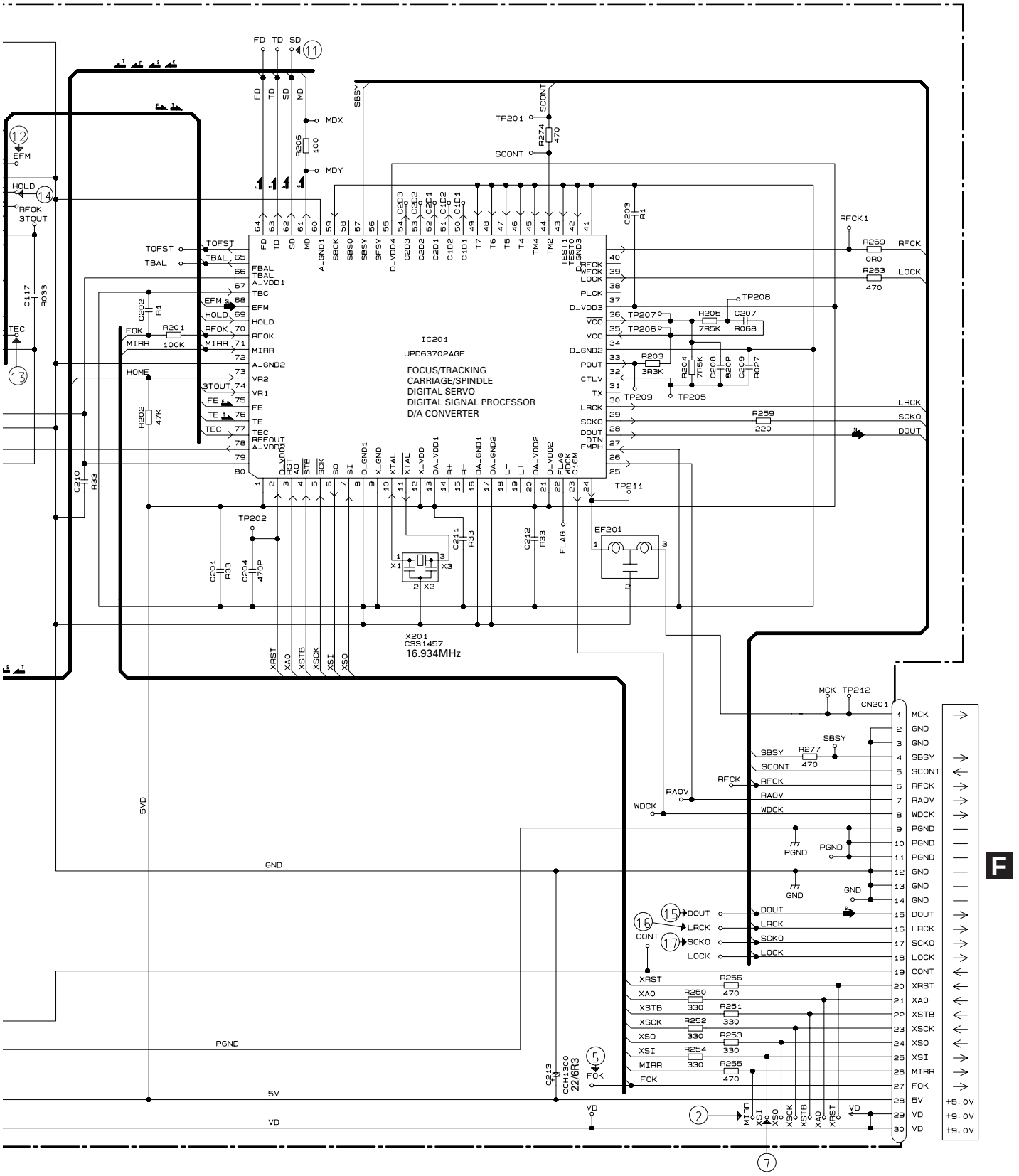

ILL
GND
BACK UP
FUSE 2A
CEK1018
1K (1/2W)
B.UP
BUP
IP-BUS DRIVER
VD
VDD
IC
ILPOW
KEYBOARD UNIT
Consists of
KEYBOARD PCB
SWITCH PCB
NOTE :
Symbol indicates a resistor.
No differentiation is made between chip resistors and discrete resistors.
Symbol indicates a capacitor.
No differentiation is made between chip capacitors and discrete capacitors.
The △mark found on some component parts indicates the importance of the safety factor of the part.
Therefore, when replacing, be sure to use parts of identical designation.
Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

A-a A-b

A-b

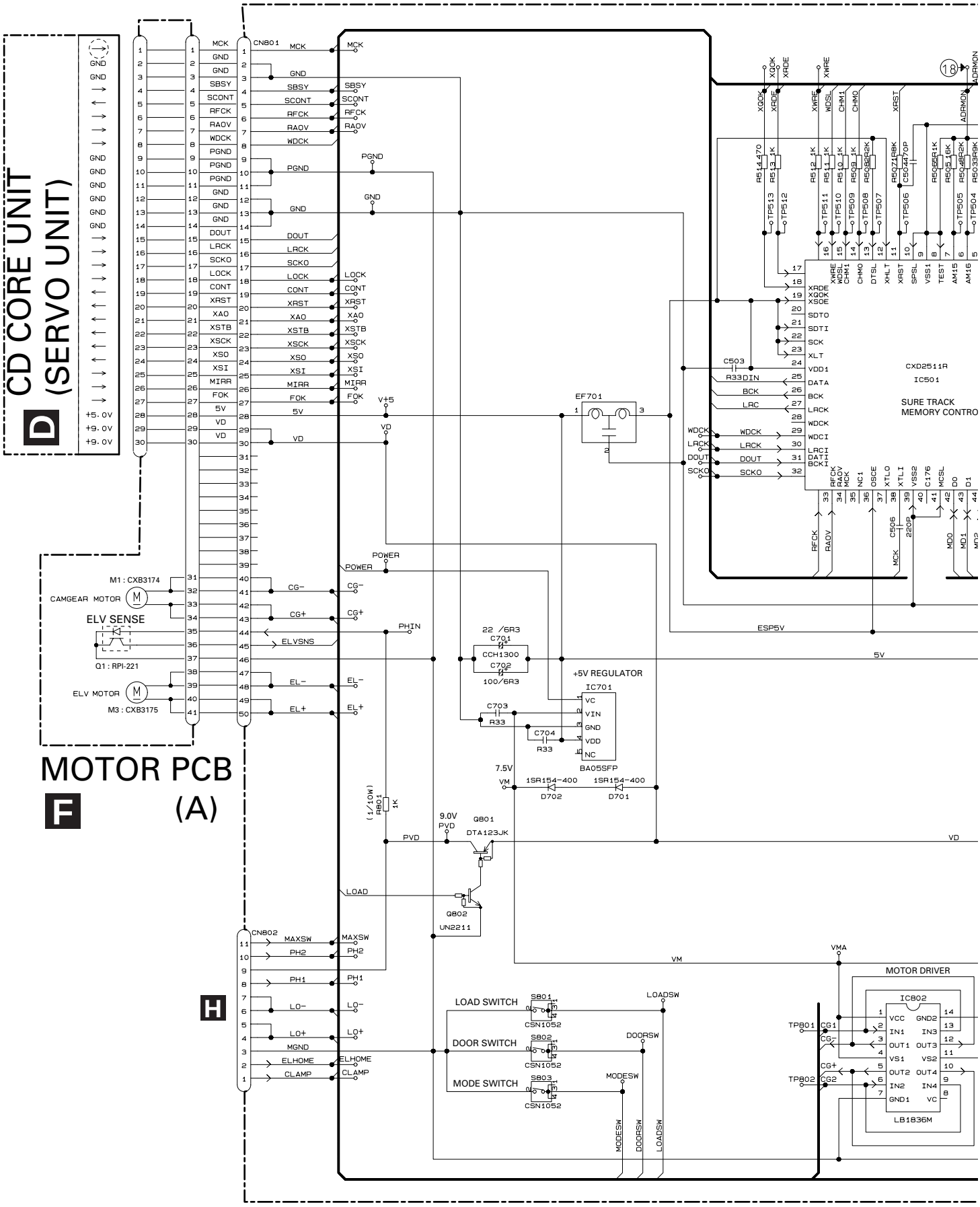
## 3.3 CD CORE UNIT(SERVO UNIT)

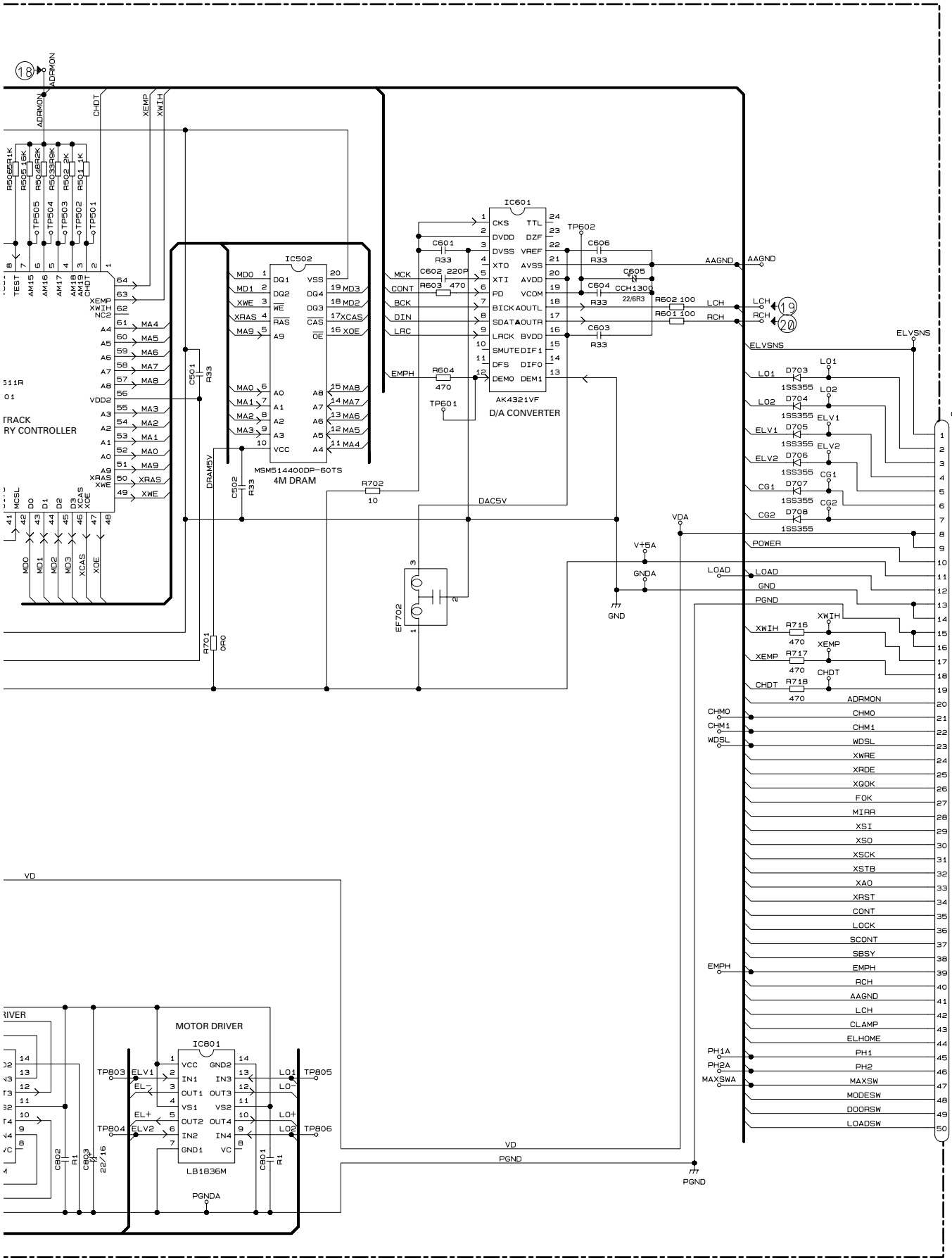



IC201
UPD63702AGF
FOCUS/TRACKING
CARRIAGE/SPINDLE
DIGITAL SERVO
DIGITAL SIGNAL PROCESSOR
D/A CONVERTER
X201
CSS1457
16.934MHz
CN201
MCK
GND
SBSY
SCONT
RFCK
RAOV
WDCK
PGND
DOUT
LRCK
SCKO
LOCK
CONT
XRST
XAO
XSTB
XSCK
XSO
XSI
MIRR
FOK
5V
VD
TOFST
TBAL
EFM
HOLD
RFOK
3TOUT
HOME
TEC
FE
TE
MDX
MDY
LRCK
SCKO
DOUT
RFCK1
LOCK

## 3.4 CD CORE UNIT(STS UNIT)

# G CD CORE UNIT(STS UNIT)

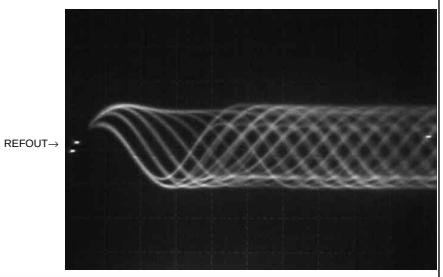



IC601
AK4321VF
D/A CONVERTER
IC502
MSM514400DP-60TS
4M DRAM
TRACK
RY CONTROLLER
MOTOR DRIVER
IC801
LB1836M
CN701
CN101
ADRMON
CHDT
XEMP
XWIH
DRAM5V
DAC5V
VDA
V+5A
GNDA
GND
PGND
VD
LOAD
POWER
ELVSNS
AAGND
LCH
RCH
EMPH
CONT
BCK
DIN
LRC
MCK
CHM0
CHM1
WDSL
XWRE
XRDE
XQOK
FOK
MIRR
XSI
XSO
XSCK
XSTB
XAO
XRST
LOCK
SCONT
SBSY
CLAMP
ELHOME
PH1
PH2
MAXSW
MODESW
DOORSW
LOADSW
+9.0V
+5.0V

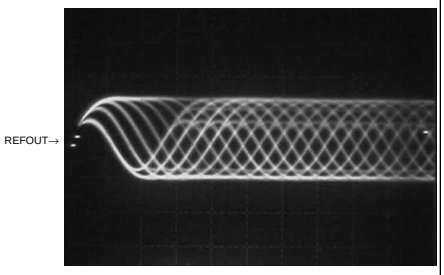
Note:1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
REFOUT:2.5V

## ● Waveforms

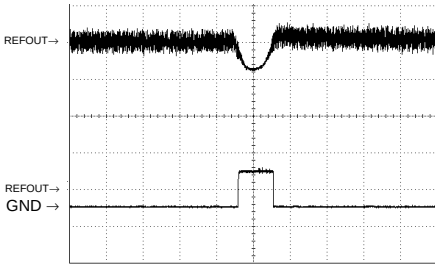
① RFO 0.5V/div. 0.2µs/div.
Normal mode: play



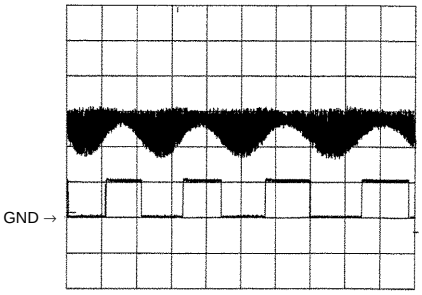

① RFO 0.5V/div. 0.5µs/div.
Test mode



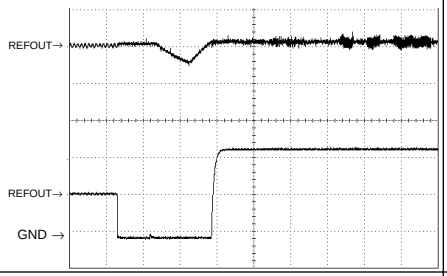

① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Normal mode: The defect part passes 500µs/div.



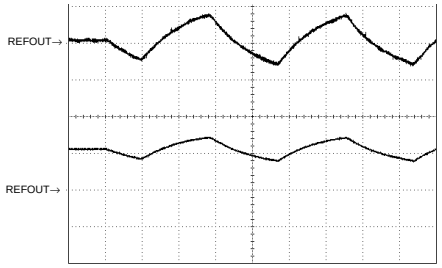

① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Test mode: Tracking open



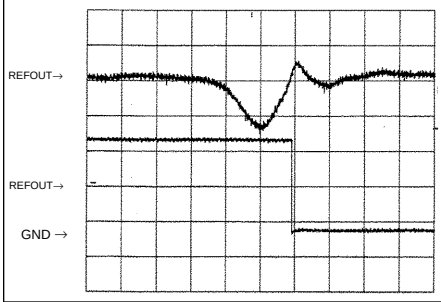

③ CH1: FIN 0.5V/div. 0.2s/div.
⑤ CH2: FOK 2V/div.
Normal mode: Focus close



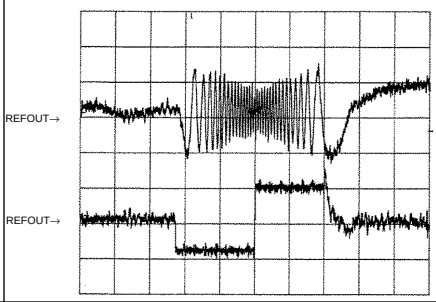

③ CH1: FIN 0.5V/div. 0.2s/div.
④ CH2: FOP 2V/div.
Test mode: No disc, Focus close



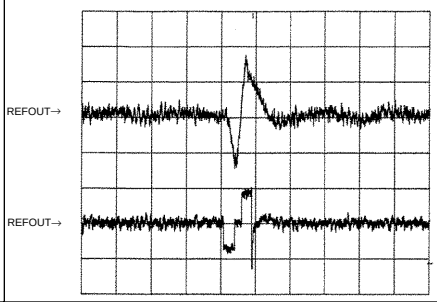

⑥ CH1: FEY 0.5V/div. 1ms/div.
⑦ CH2: XSI 2V/div.
Normal mode: Focus close



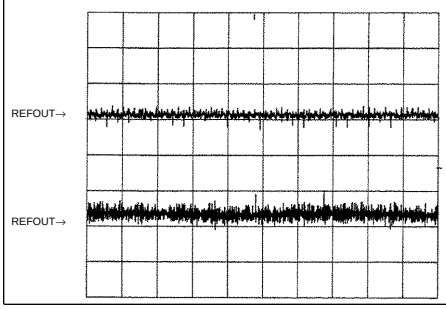

⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div.
Test mode: 32 tracks jump (FWD)



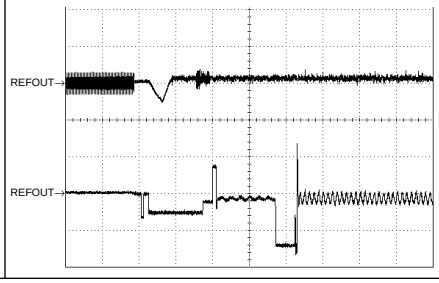

⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div.
Test mode: Single jump (FWD)




⑥ CH1: FEY 0.1V/div. 20ms/div.
③ CH2: FIN 0.2V/div.
Normal mode: Play

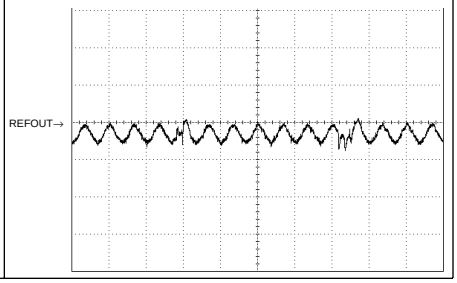



③ CH1: FIN 0.5V/div. 0.5s/div.
⑩ CH2: SIN 1V/div.
Normal mode: Focus close

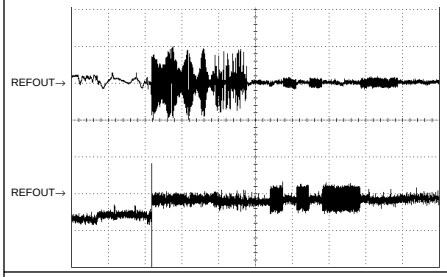



⑩ SIN 0.5V/div. 0.1s/div.

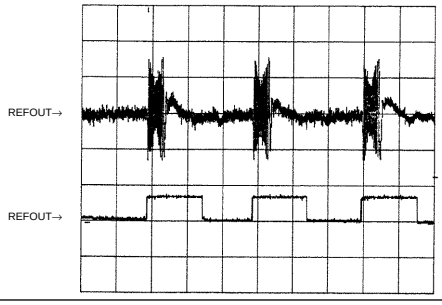
Normal mode: Play



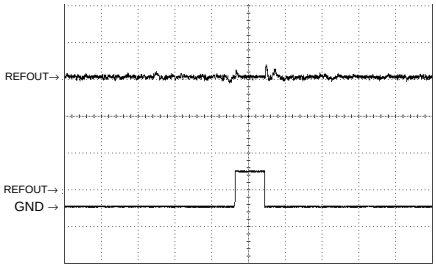
⑧ CH1: TEY 0.5V/div.
⑥ CH2: FEY 0.1V/div. 0.2s/div.
Normal mode: AGC after focus close



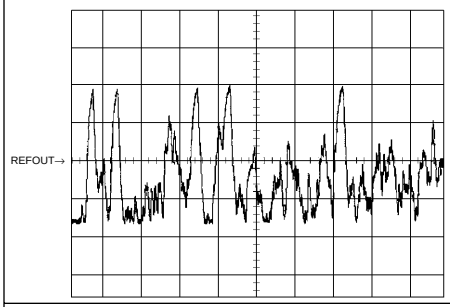

⑧ CH1: TEY 0.5V/div.
⑪ CH2: SD 0.5V/div. 5ms/div.



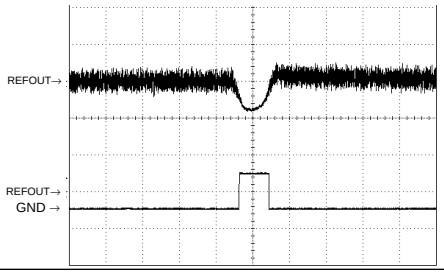

③ CH1: FIN 1V/div.
⑭ CH2: HOLD 5V/div. 500µs/div.
Normal mode: The defect part passes 800µm



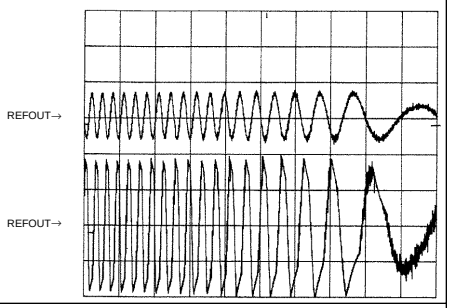

⑩ SIN 1V/div. 10ms/div.
Long Search



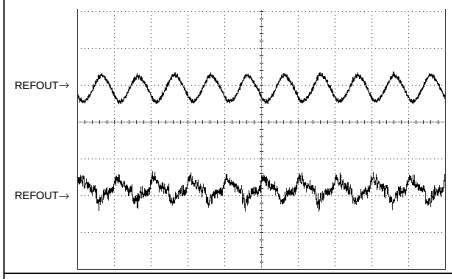

① CH1: RFO 1V/div.
⑭ CH2: HOLD 5V/div. 500µs/div.
Normal mode: The defect part passes 800µm



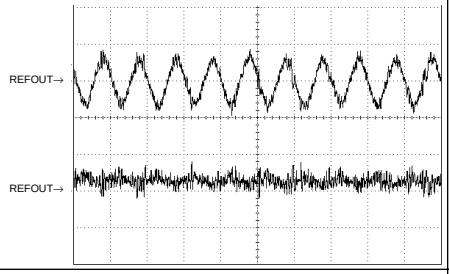

⑧ CH1: TEY 1V/div.
⑬ CH2: TEC 1V/div. 2ms/div.
Test mode: Focus close
Tracking open



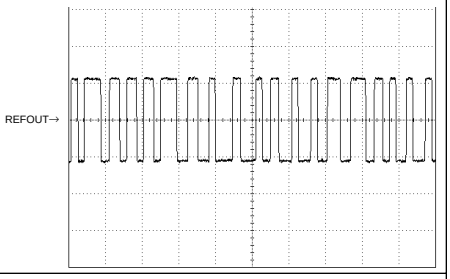

⑥ CH1: FEY 0.2V/div.
③ CH2: FIN 0.5V/div. 1ms/div.
Normal mode: During AGC



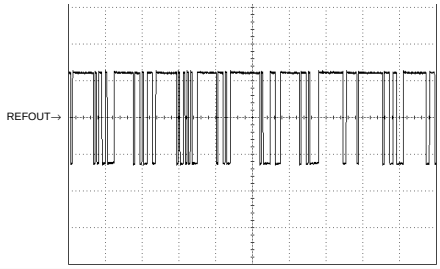

⑧ CH1: TEY 0.2V/div.
⑨ CH2: TIN 0.5V/div. 1ms/div.
Normal mode: During AGC



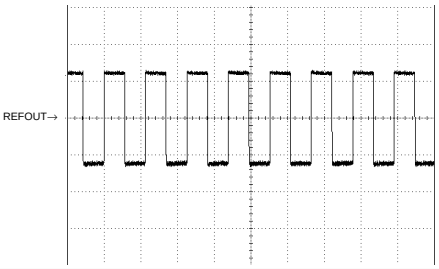

⑫ EFM 1V/div. 2µs/div.
Play



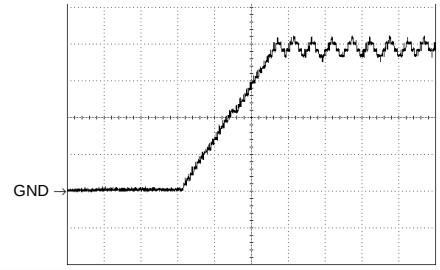

⑮ Dout 2V/div. 5µs/div.
Play



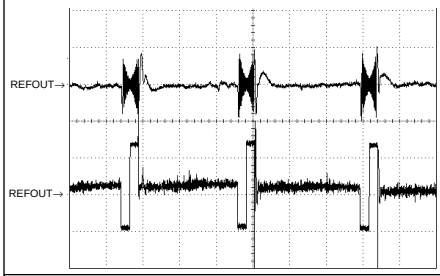

⑯ LRCK 2V/div. 10µs/div.




⑱ ADRMON 1V/div. 1s/div.
Normal mode: Starting play



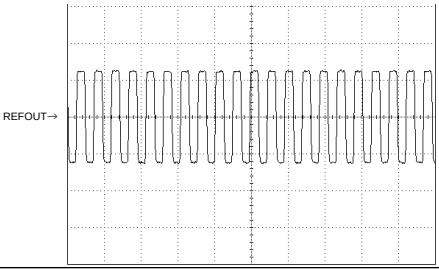
⑧ CH1: TEY 0.5V/div.
⑨ CH2: TIN 0.5V/div. 5ms/div.
Test mode: 100 tracks jump(FWD)



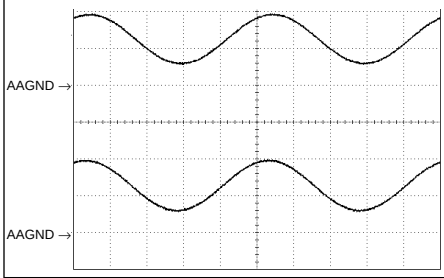

⑧ CH1: TEY 0.5V/div.
⑨ CH2: TIN 0.5V/div. 10ms/div.
Normal mode: Play

⑰ SCKO 2V/div. 500ns/div.

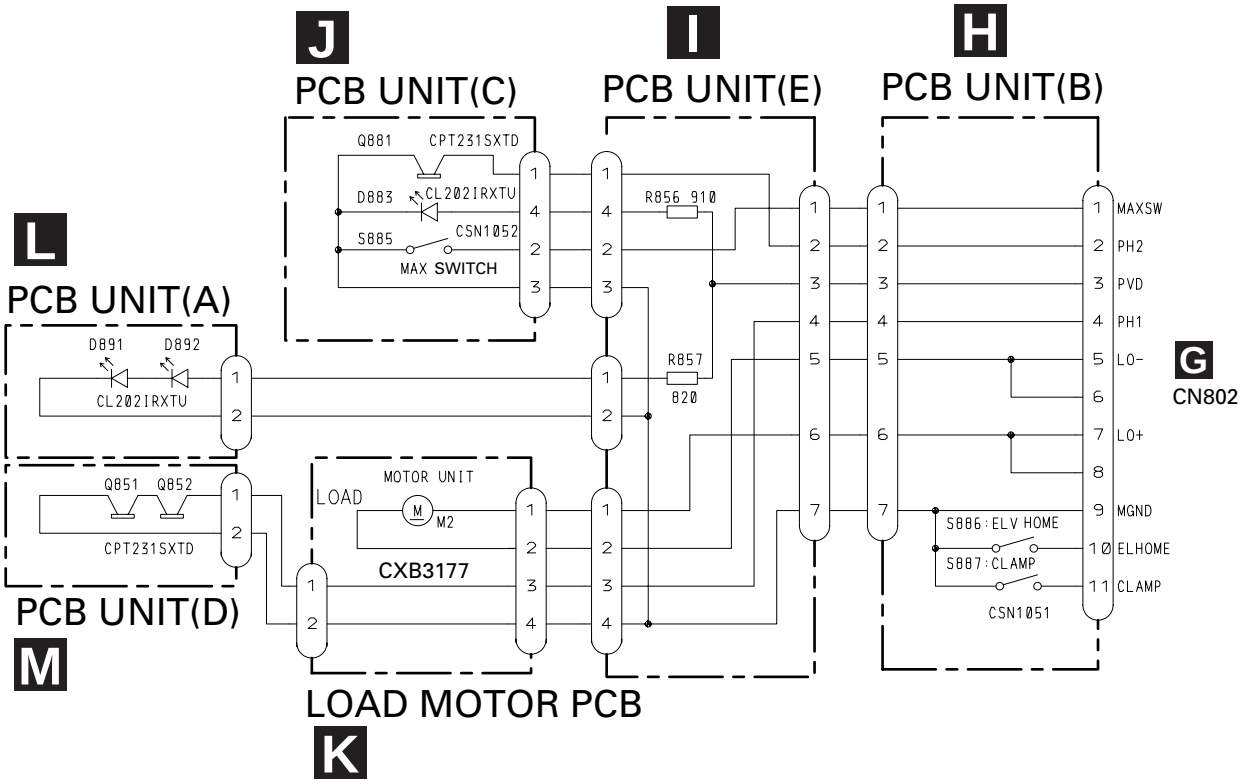
Play




⑳ CH1: RCH 2V/div.
⑲ CH2: LCH 2V/div. 200µs/div.
Normal mode: PLAY (0dB,1kHz)



## 3.5 PCB UNIT(A,B,C,D,E), LOAD MOTOR PCB

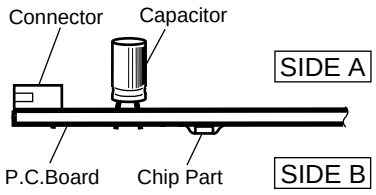


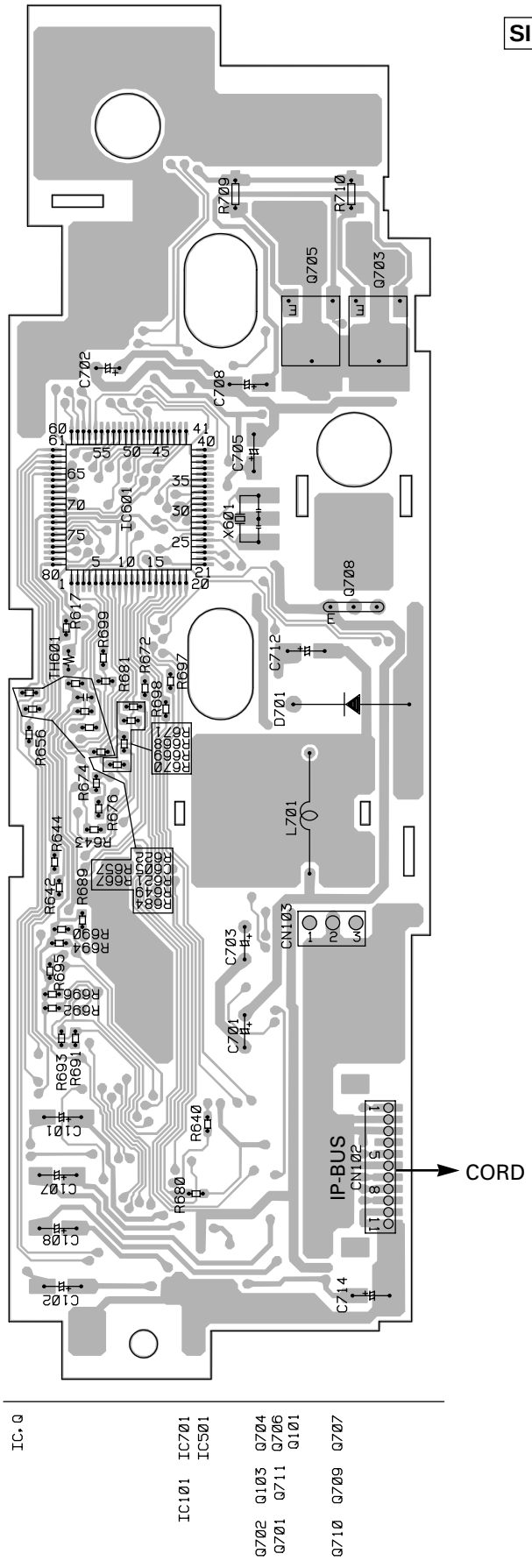
# 4. PCB CONNECTION DIAGRAM

## 4.1 EXTENDED UNIT

### NOTE FOR PCB DIAGRAMS

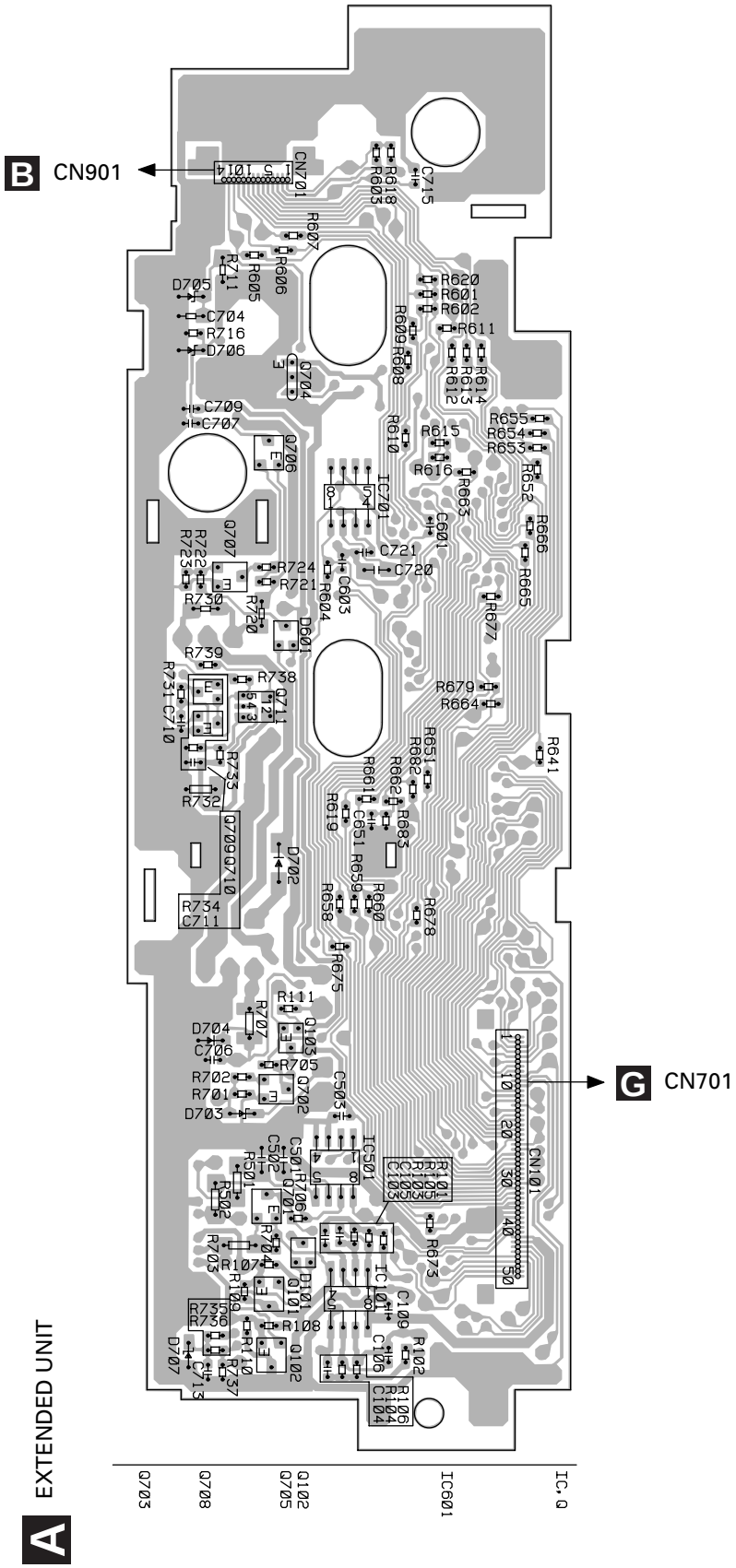
1. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.
2. Viewpoint of PCB diagrams



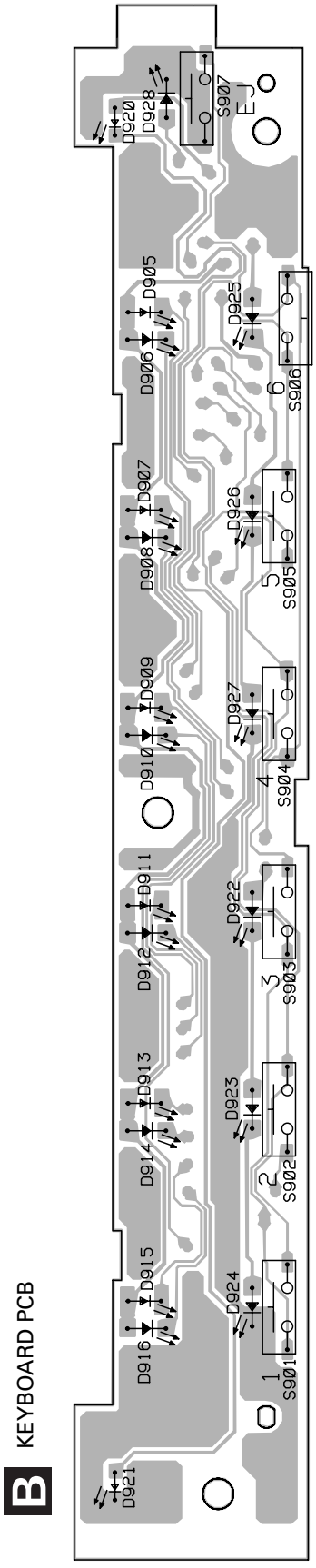

EXTENDED UNIT

SIDE B

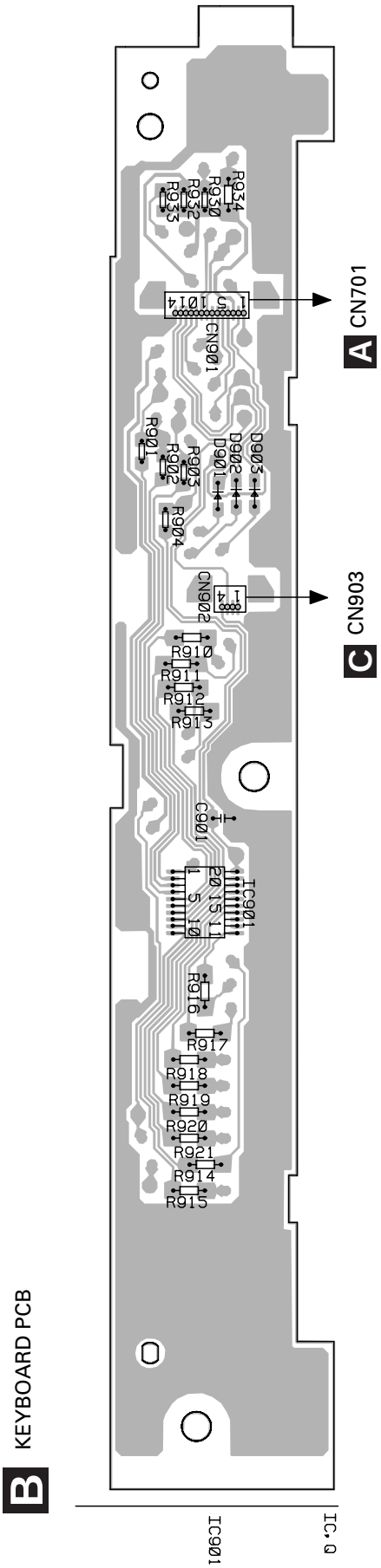

B CN901
G CN701
A EXTENDED UNIT
CN701
CN101
IC701
IC501
IC101
IC601
Q703
Q708
Q102
Q705
IC,Q

## 4.2 KEYBOARD PCB

SIDE A




SIDE B



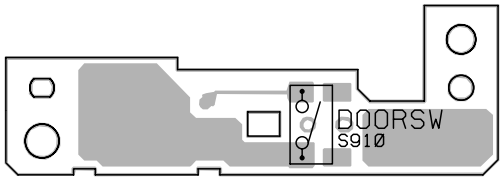



B

## 4.3 SWITCH PCB

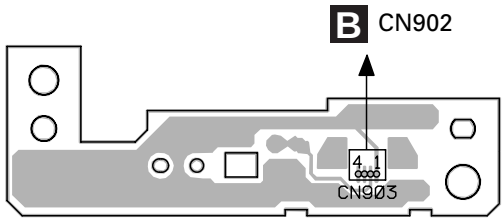
C SWITCH PCB

SIDE A



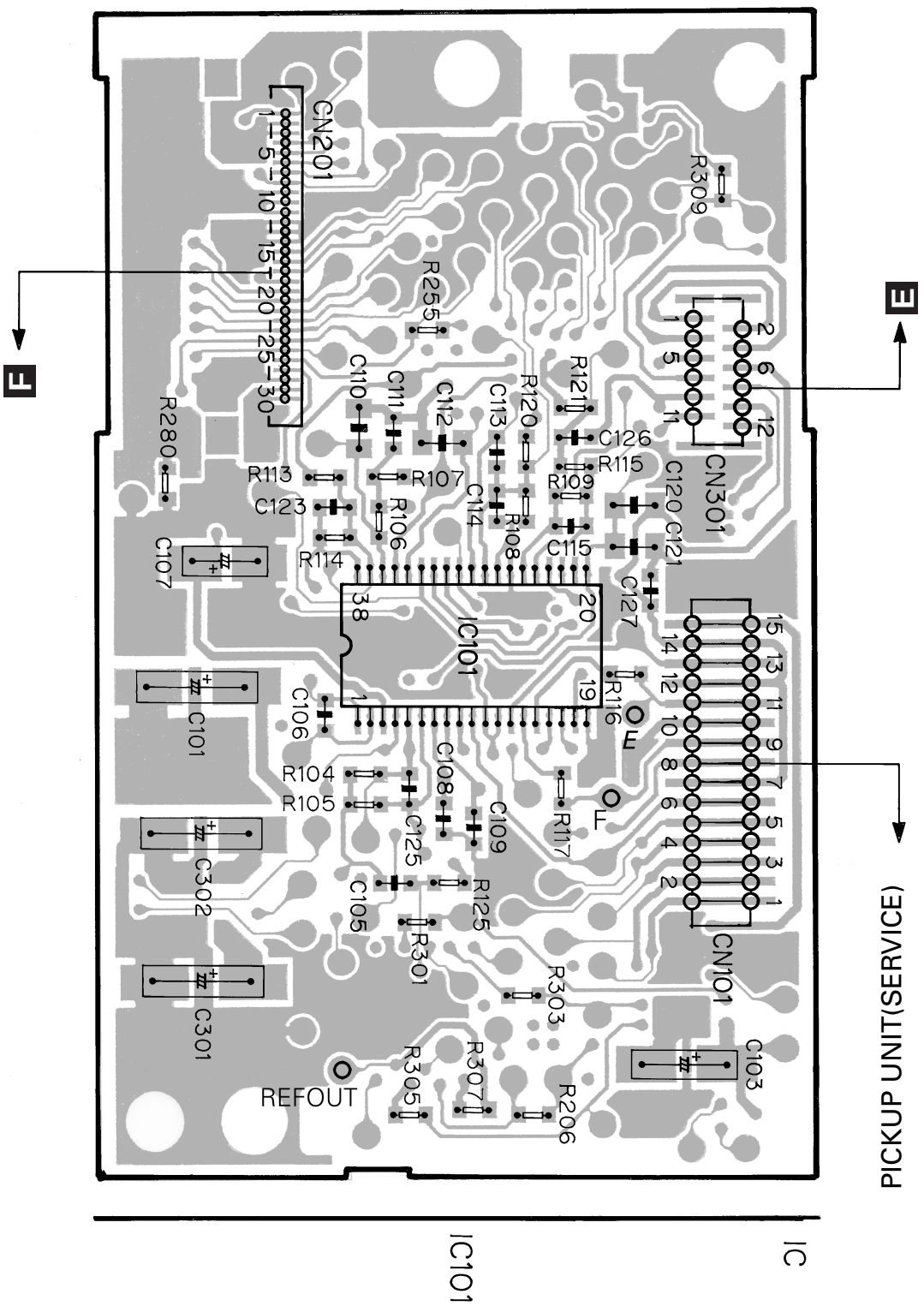

C SWITCH PCB

SIDE B

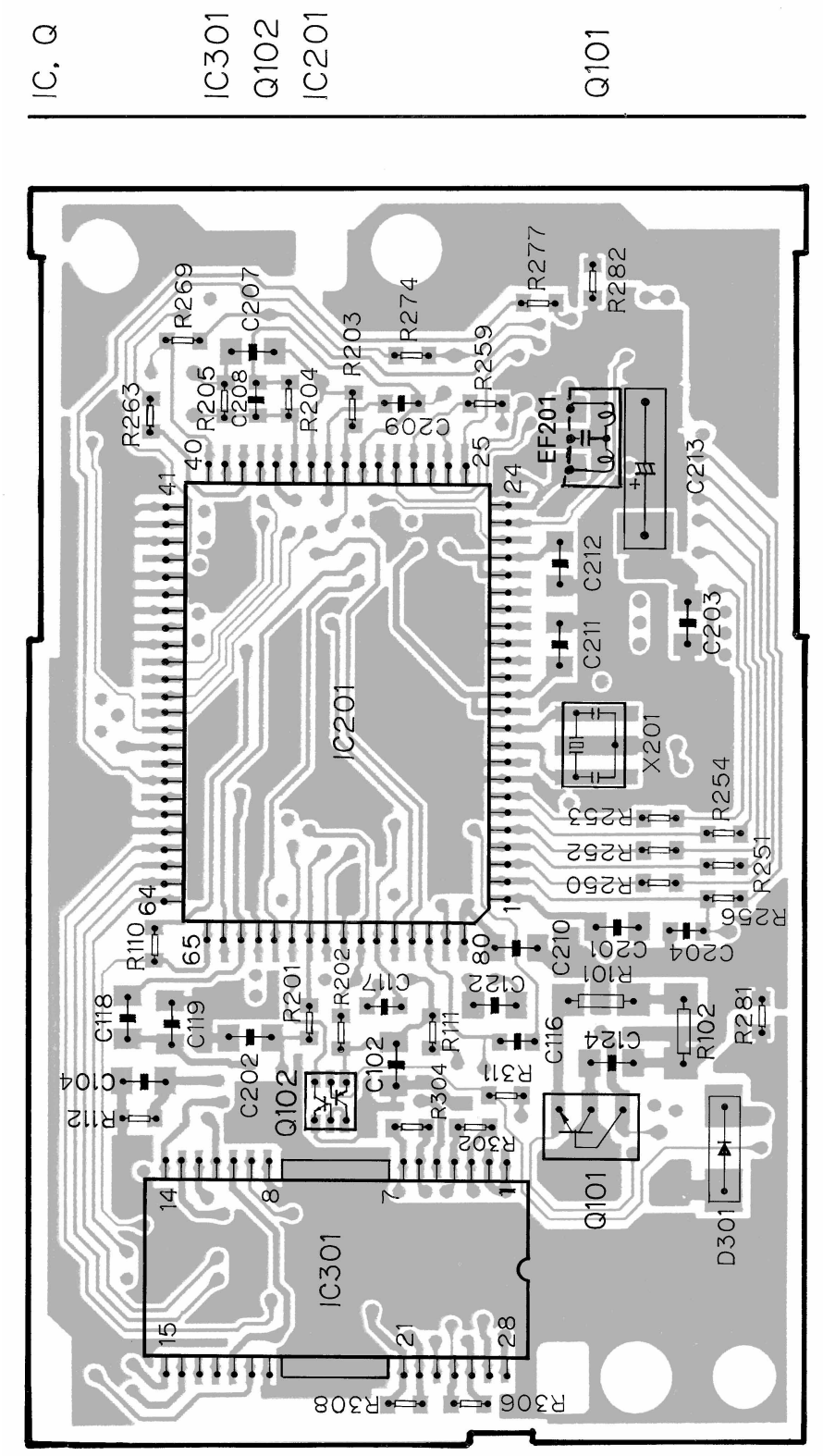


## 4.4 CD CORE UNIT(SERVO UNIT)

SIDE A



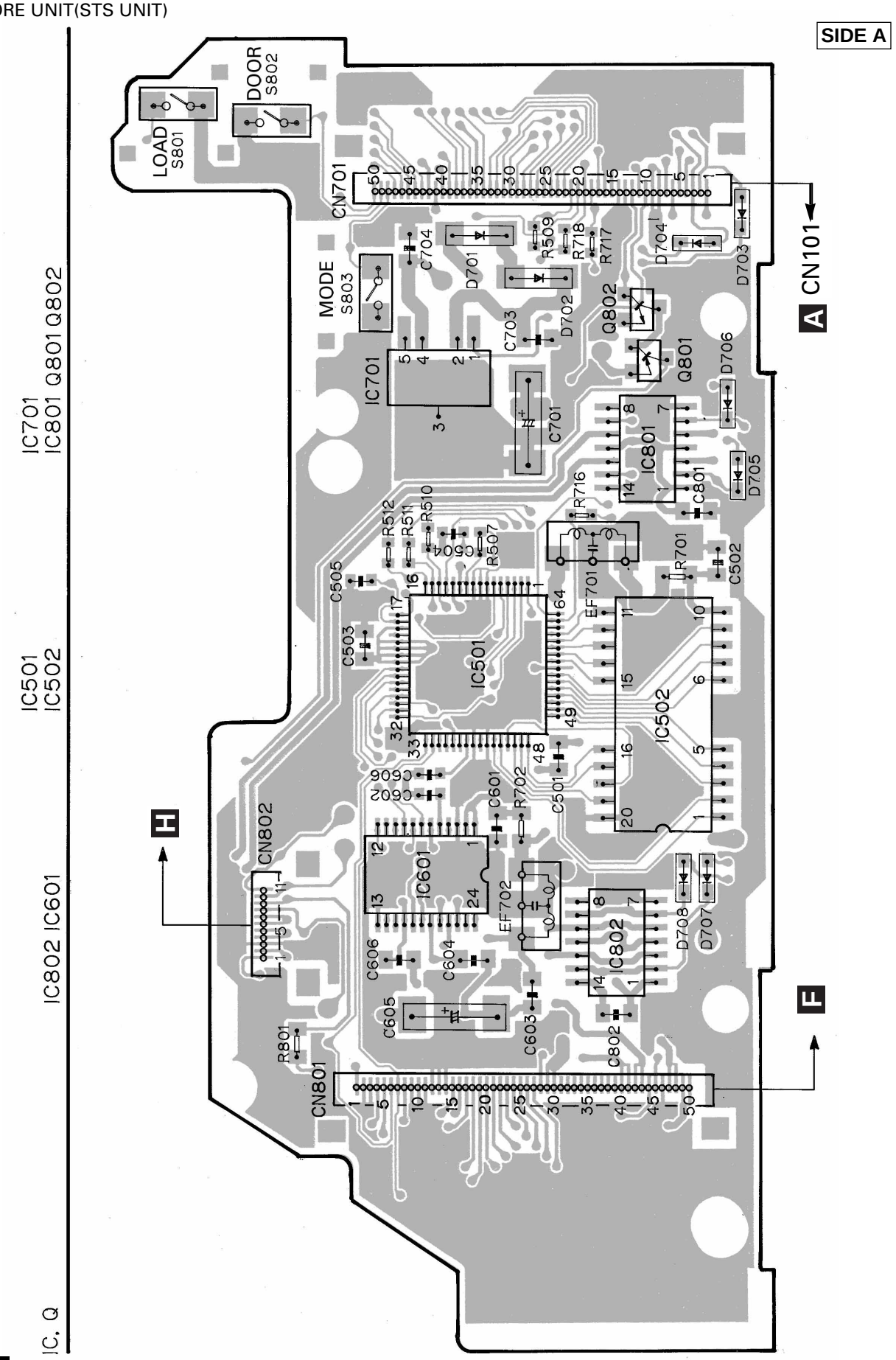
SIDE B




D CD CORE UNIT(SERVO UNIT)

## 4.5 CD CORE UNIT(STS UNIT)

**G** CD CORE UNIT(STS UNIT)

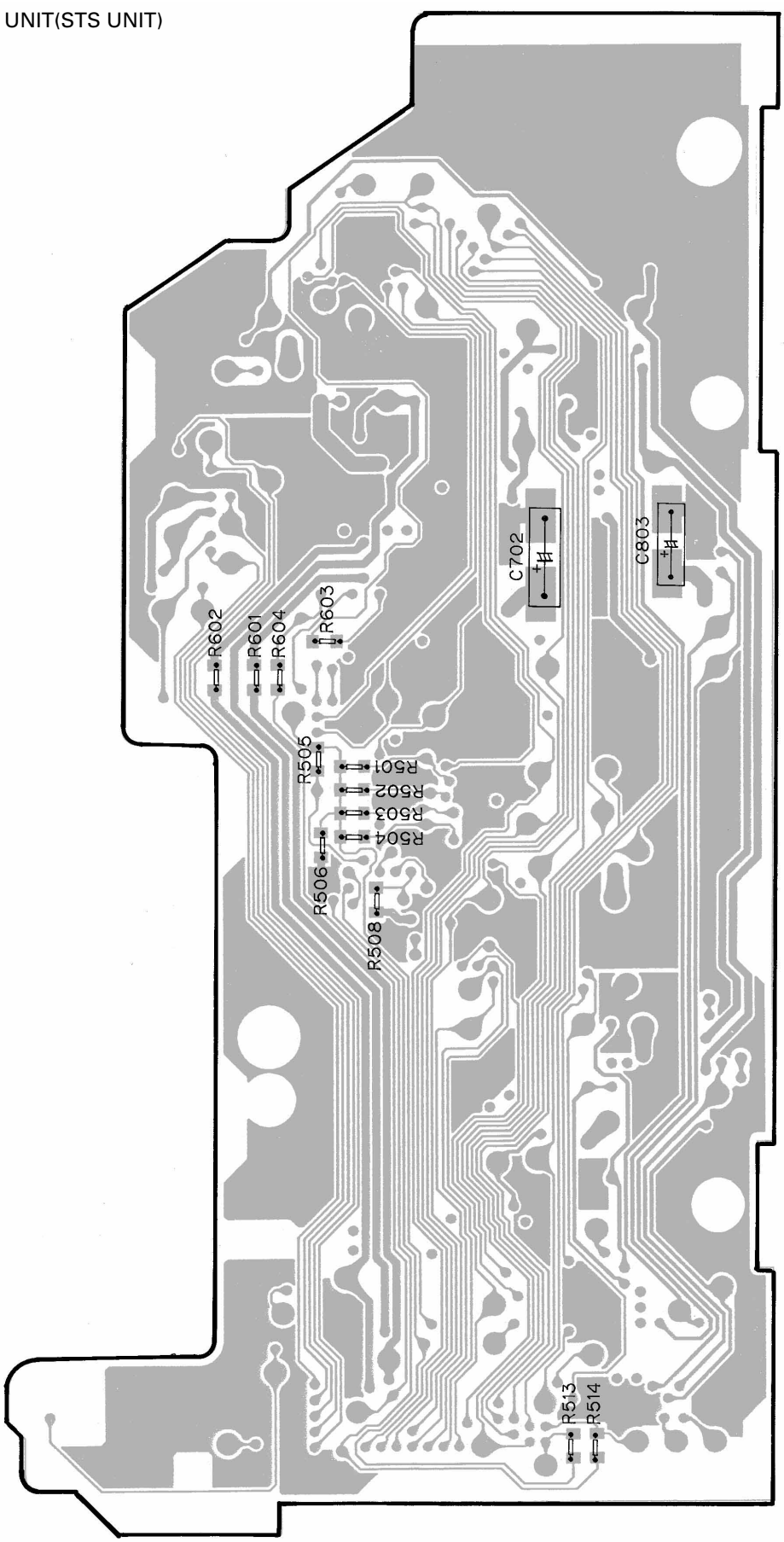





**G**

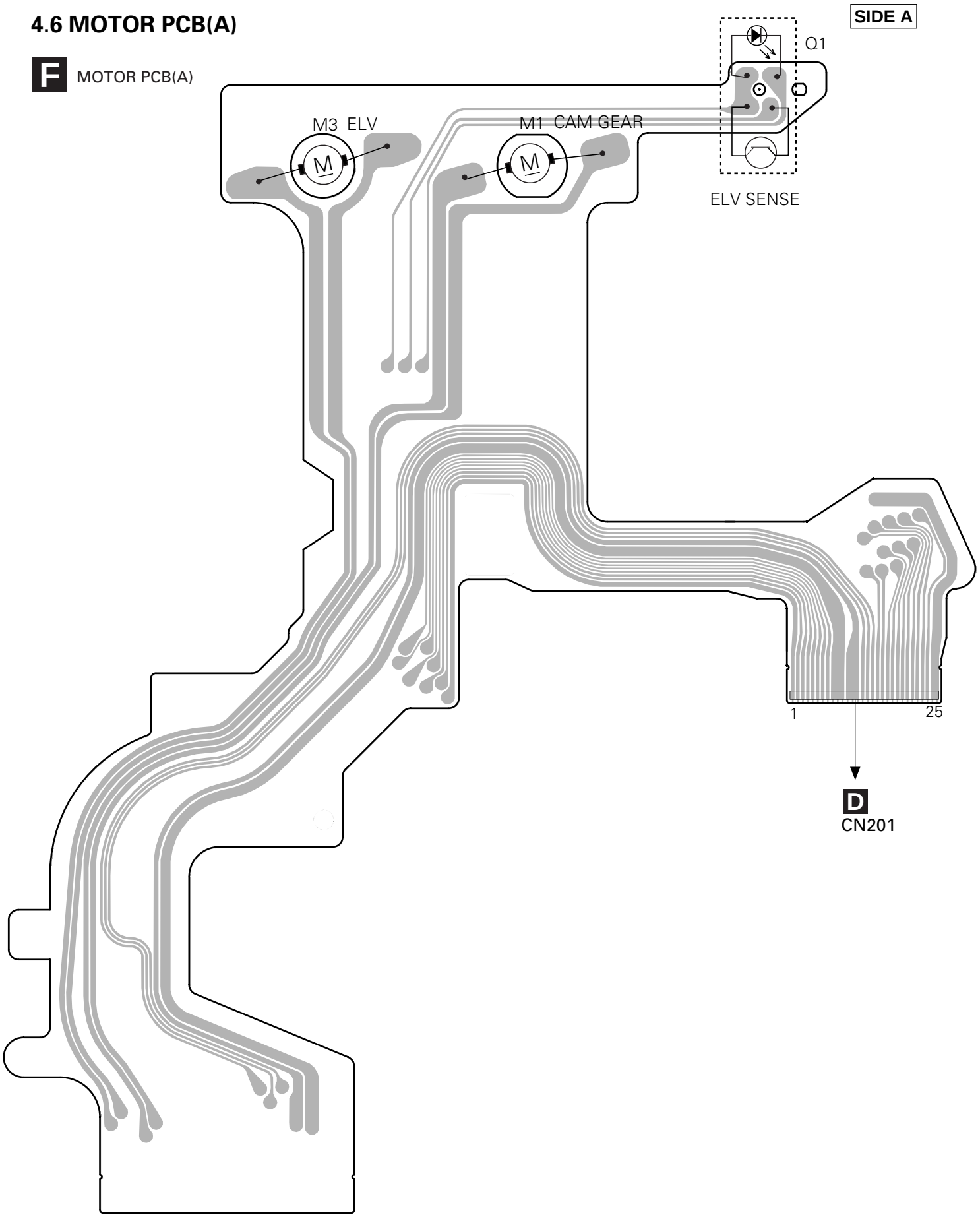
**G** CD CORE UNIT(STS UNIT)

**SIDE B**



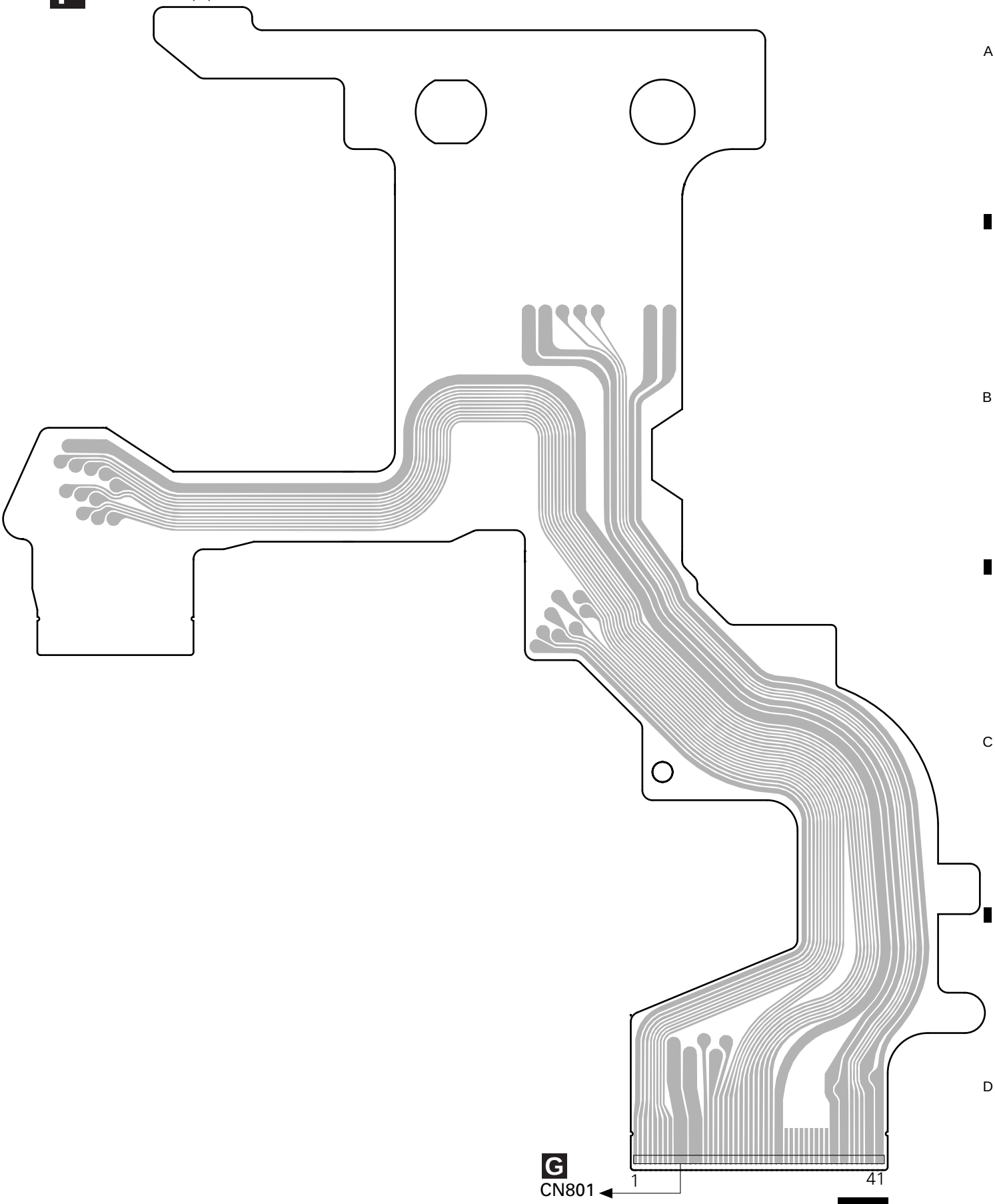
## 4.6 MOTOR PCB(A)

F MOTOR PCB(A)



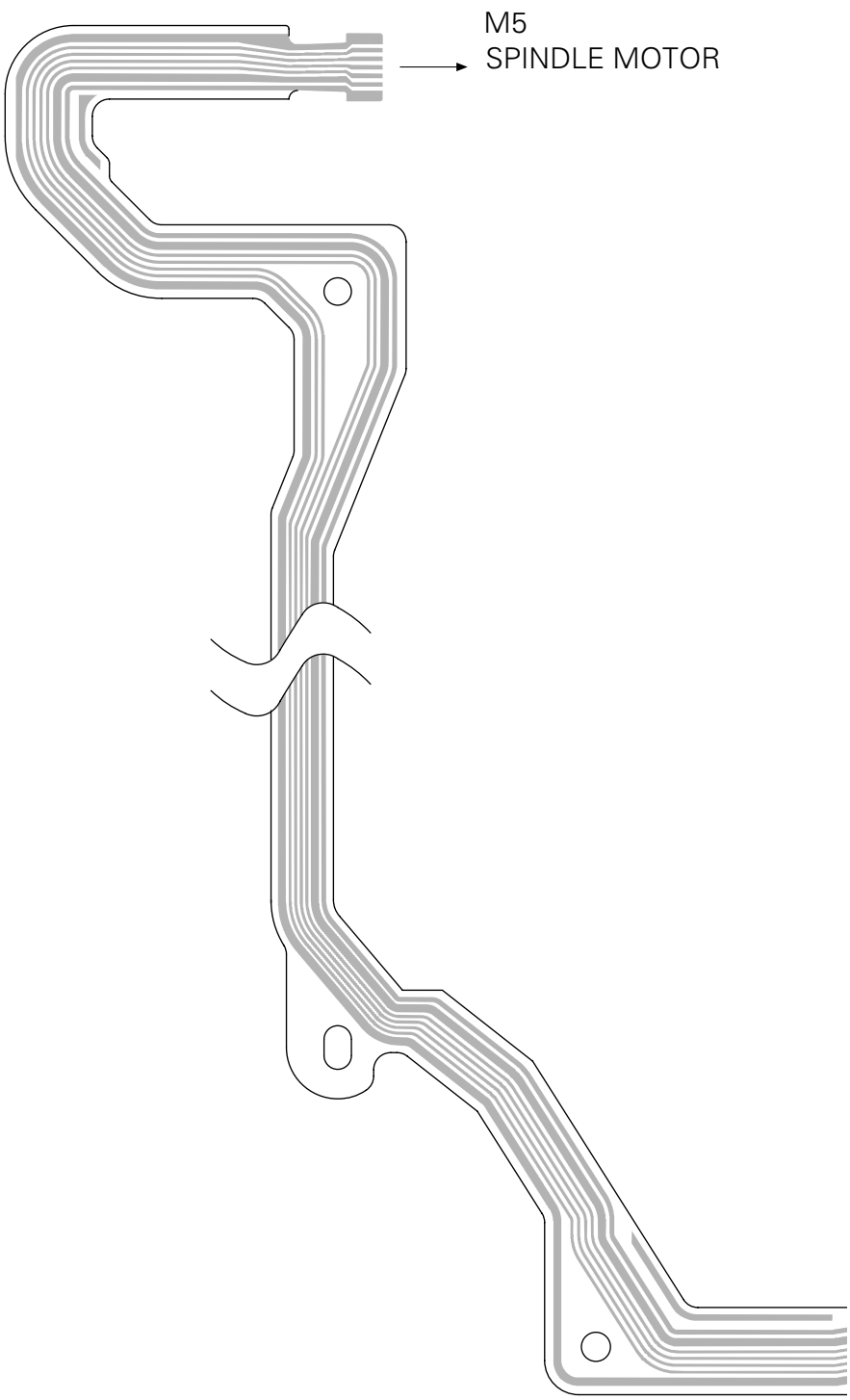
SIDE B

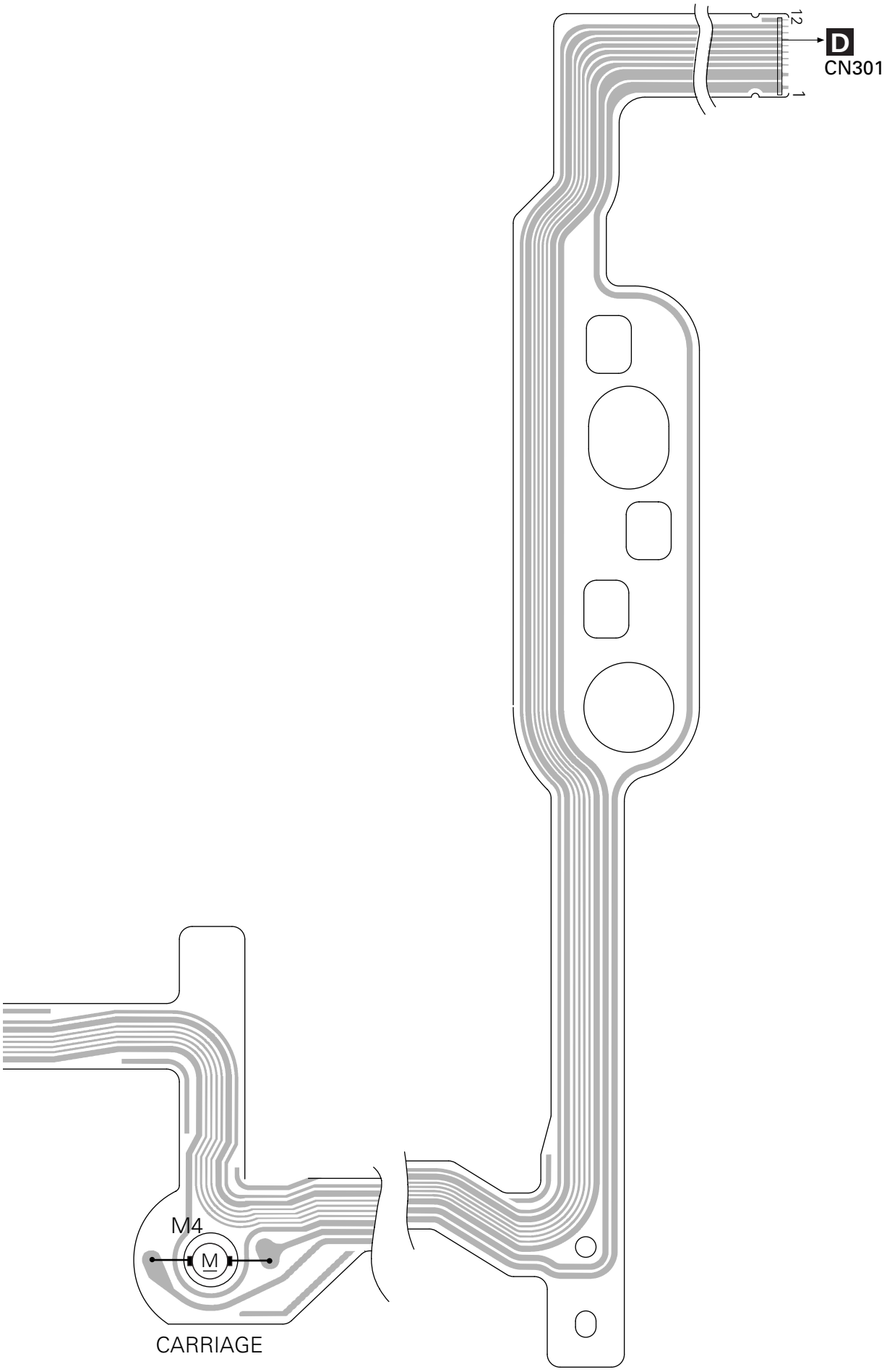
F MOTOR PCB(A)



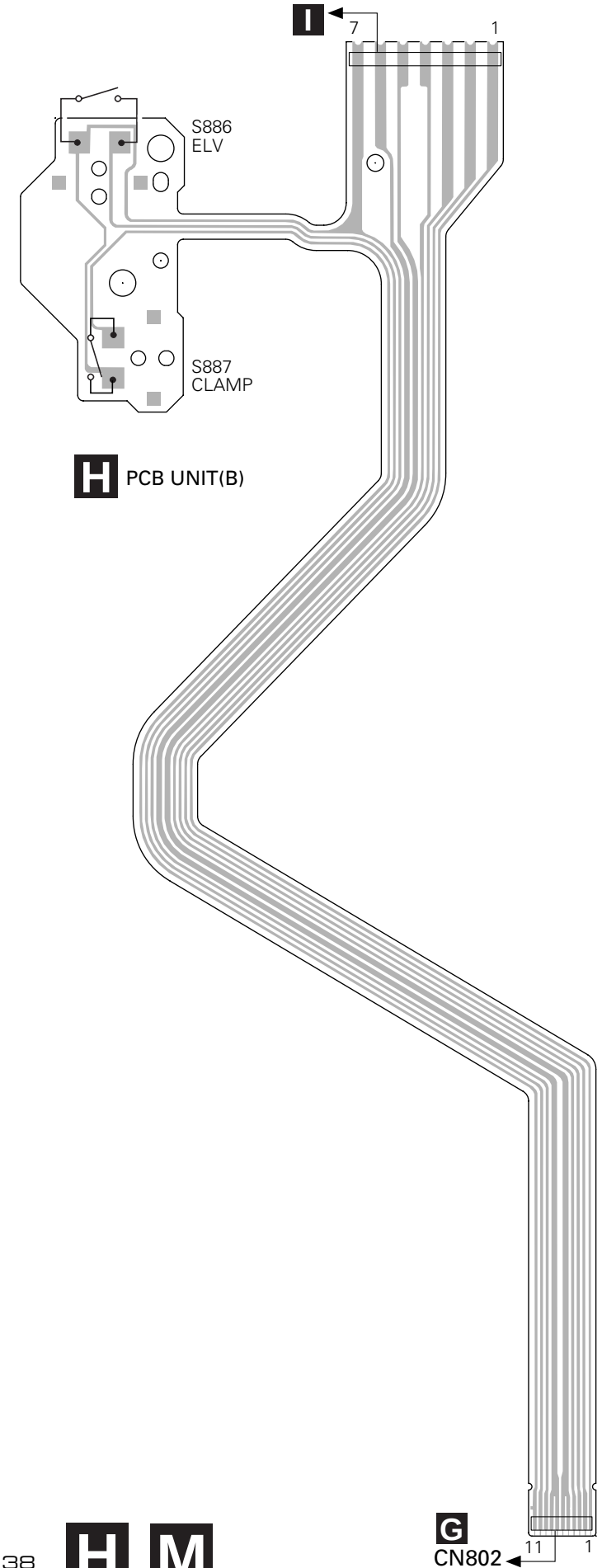
## 4.7 MOTOR PCB(B)

E MOTOR PCB(B)

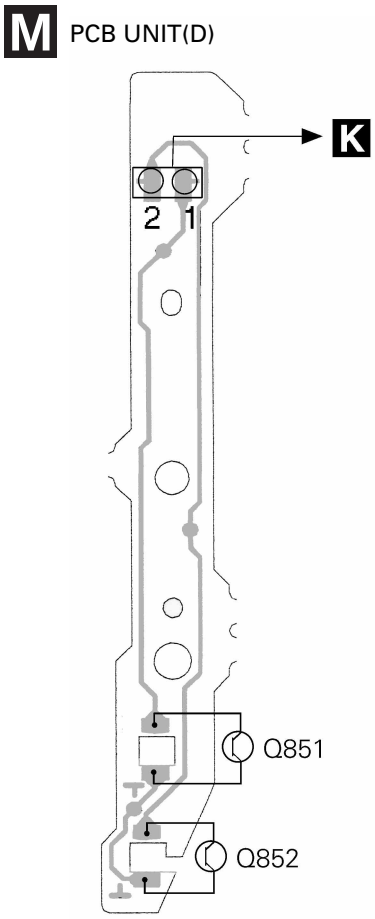



12
1
D
CN301
M4
M
CARRIAGE

## 4.8 PCB UNIT(B)

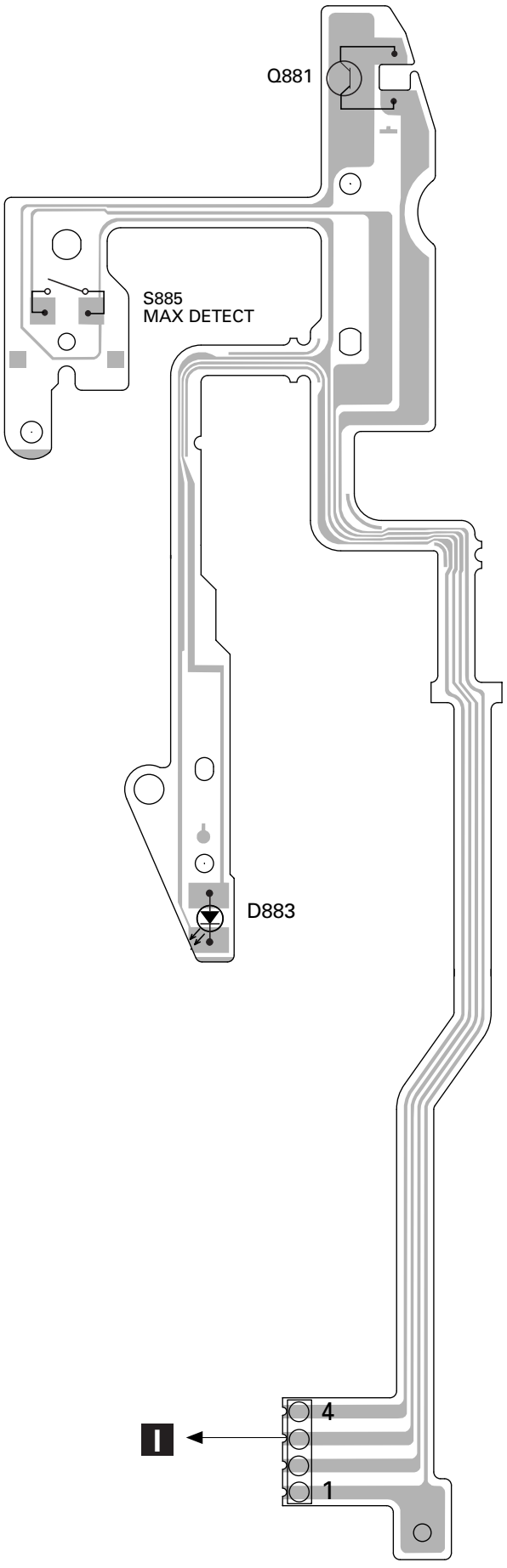



## 4.8 PCB UNIT(D)

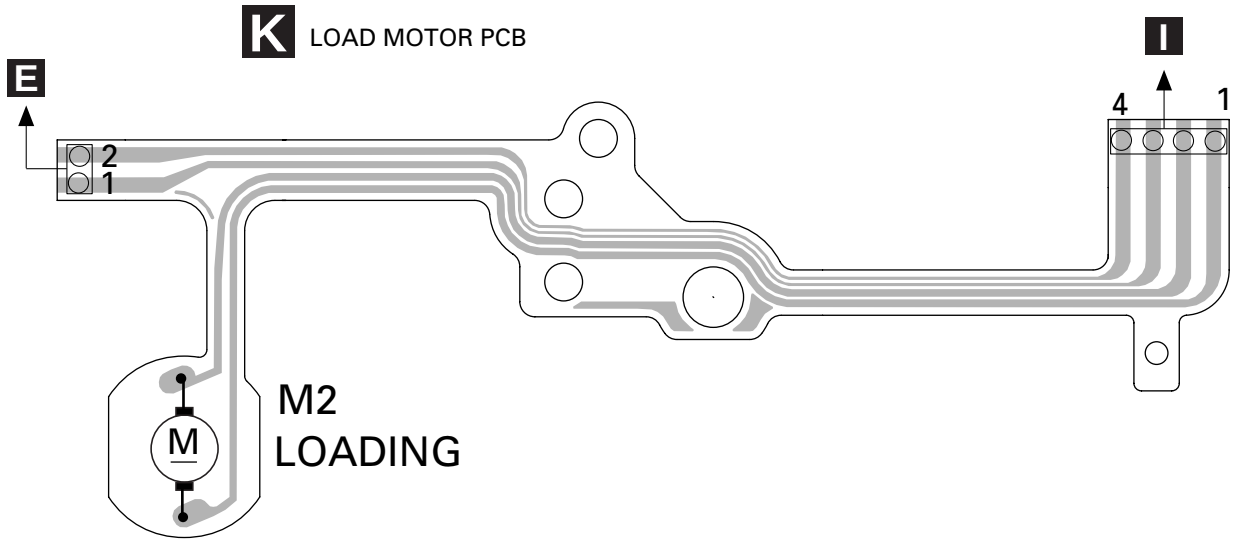


## 4.10 PCB UNIT(C)

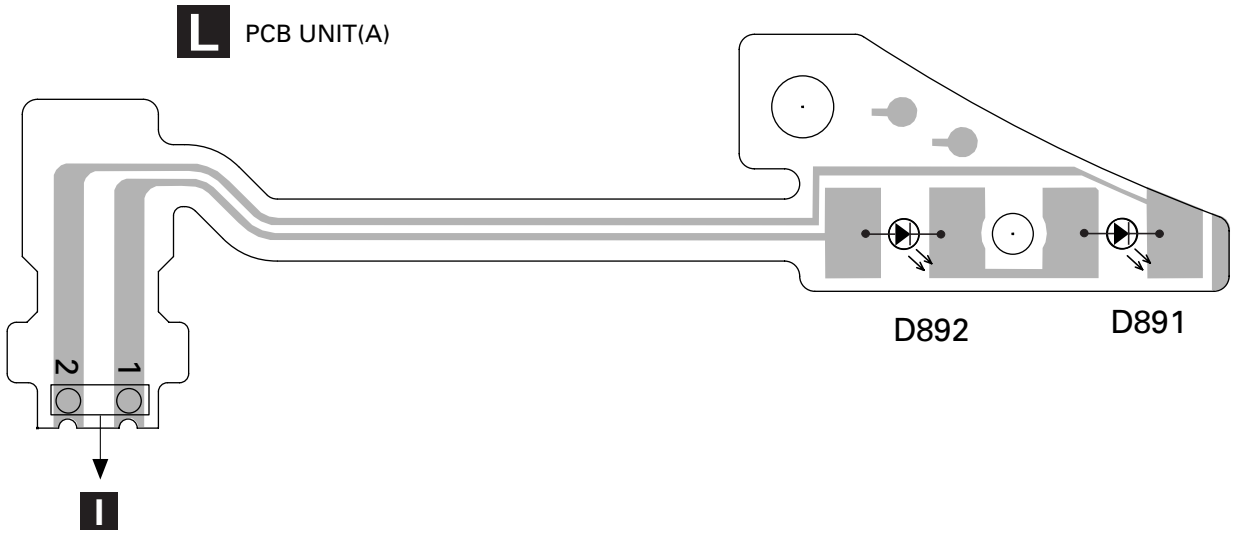
J PCB UNIT(C)



## 4.11 LOAD MOTOR PCB



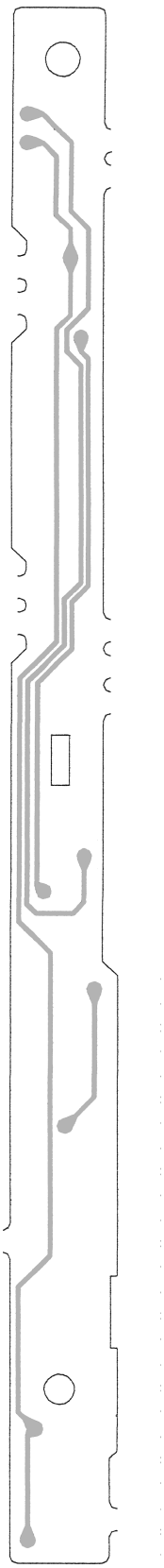

## 4.12 PCB UNIT(A)



## 4.13 PCB UNIT(E)

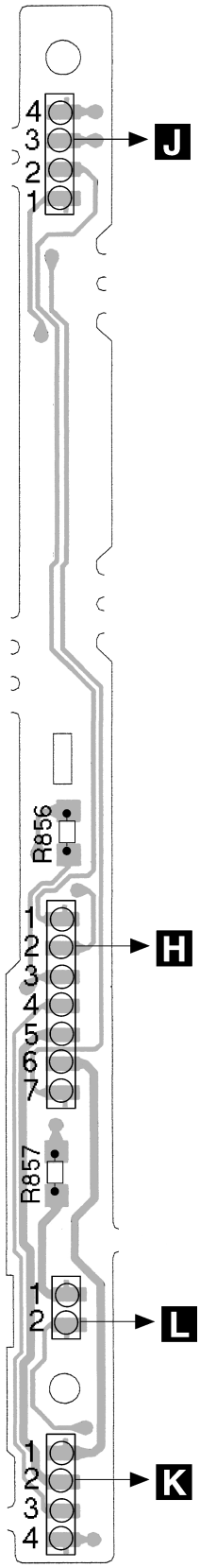
I PCB UNIT(E)

SIDE A



I PCB UNIT(E)

SIDE B



# 5. ELECTRICAL PARTS LIST

**NOTE:**

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

Chip Resistor

RS1/○S○○○J,RS1/○○S○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

**A** Unit Number : CWM6526
Unit Name : Extended Unit

MISCELLANEOUS

| =====Circuit Symbol & No. | | ===Part Name | Part No. |
|---|---|---|---|
| IC | 101 | IC | NJM4558MD |
| IC | 501 | IC | CA0008AM |
| IC | 601 | IC | PD5465A |
| IC | 701 | IC | M62007FP |
| Q | 101 | Transistor | DTC343TK |
| Q | 102 | Transistor | DTC343TK |
| Q | 103 | Transistor | 2SA1586 |
| Q | 701 | Transistor | 2SC2712 |
| Q | 702 | Transistor | 2SC2712 |
| Q | 703 | Transistor | 2SD1760F5 |
| Q | 704 | Transistor | 2SD1007 |
| Q | 705 | Transistor | 2SD1760F5 |
| Q | 706 | Transistor | 2SA1163 |
| Q | 707 | Transistor | 2SC2713 |
| Q | 708 | Transistor | 2SB1335A |
| Q | 709 | Transistor | DTA124EU |
| Q | 710 | Transistor | DTC124EU |
| Q | 711 | Transistor | FMW1 |
| D | 101 | Diode | MA142WA |
| D | 601 | Diode | MA142WK |
| D | 701 | Diode | ERC05-10B |
| D | 702 | Diode | 1SR154-400 |
| D | 703 | Diode | UDZS7R5(B) |
| D | 704 | Diode | 1SS355 |
| D | 705 | Diode | UDZS5R6(B) |
| D | 706 | Diode | UDZS9R1(B) |
| D | 707 | Diode | UDZS6R2(B) |
| L | 701 | Coil | CTH1190 |
| TH | 601 | Thermistor | CCX1032 |
| X | 601 | Resonator 6.290MHz | CSS1451 |

RESISTORS

| =====Circuit Symbol & No. | | ===Part Name | Part No. |
|---|---|---|---|
| R | 101 | | RS1/16S472J |
| R | 102 | | RS1/16S472J |
| R | 103 | | RS1/16S682J |
| R | 104 | | RS1/16S682J |
| R | 105 | | RS1/16S622J |
| R | 106 | | RS1/16S622J |
| R | 107 | | RS1/16S102J |
| R | 108 | | RS1/16S102J |
| R | 109 | | RS1/16S432J |
| R | 110 | | RS1/16S432J |
| R | 111 | | RS1/16S103J |
| R | 501 | | RS1/8S101J |
| R | 502 | | RS1/8S101J |
| R | 601 | | RS1/16S473J |
| R | 602 | | RS1/16S473J |
| R | 603 | | RS1/16S473J |
| R | 604 | | RS1/16S102J |
| R | 605 | | RS1/16S222J |
| R | 606 | | RS1/16S222J |
| R | 607 | | RS1/16S222J |
| R | 608 | | RS1/16S222J |
| R | 609 | | RS1/16S222J |
| R | 610 | | RS1/16S222J |
| R | 611 | | RS1/16S561J |
| R | 612 | | RS1/16S561J |
| R | 613 | | RS1/16S561J |
| R | 614 | | RS1/16S561J |
| R | 615 | | RS1/16S102J |
| R | 616 | | RS1/16S473J |
| R | 617 | | RS1/16S183J |
| R | 618 | | RS1/16S222J |
| R | 619 | | RS1/16S0R0J |
| R | 620 | | RS1/16S473J |
| R | 621 | | RS1/16S433J |
| R | 622 | | RS1/16S103J |
| R | 640 | | RS1/16S471J |
| R | 641 | | RS1/16S471J |
| R | 642 | | RS1/16S471J |
| R | 643 | | RS1/16S471J |
| R | 644 | | RS1/16S471J |
| R | 649 | | RS1/16S222J |
| R | 651 | | RS1/16S222J |
| R | 652 | | RS1/16S471J |
| R | 653 | | RS1/16S471J |
| R | 654 | | RS1/16S471J |
| R | 655 | | RS1/16S471J |
| R | 656 | | RS1/16S471J |
| R | 657 | | RS1/16S471J |
| R | 658 | | RS1/16S471J |
| R | 659 | | RS1/16S471J |
| R | 660 | | RS1/16S471J |
| R | 661 | | RS1/16S102J |
| R | 662 | | RS1/16S102J |
| R | 663 | | RS1/16S102J |
| R | 664 | | RS1/16S102J |
| R | 665 | | RS1/16S102J |
| R | 666 | | RS1/16S471J |
| R | 667 | | RS1/16S471J |
| R | 668 | | RS1/16S331J |
| R | 669 | | RS1/16S331J |
| R | 670 | | RS1/16S331J |
| R | 671 | | RS1/16S331J |
| R | 672 | | RS1/16S331J |
| R | 673 | | RS1/16S471J |
| R | 674 | | RS1/16S471J |
| R | 675 | | RS1/16S471J |
| R | 676 | | RS1/16S471J |
| R | 677 | | RS1/16S222J |
| R | 678 | | RS1/16S222J |
| R | 679 | | RS1/16S222J |

| =====Circuit Symbol & No. | ===Part Name | Part No. |
|---|---|---|
| R 680 | | RS1/16S154J |
| R 681 | | RS1/16S222J |
| R 682 | | RS1/16S102J |
| R 683 | | RS1/16S912J |
| R 684 | | RS1/16S473J |
| R 689 | | RS1/16S104J |
| R 690 | | RS1/16S104J |
| R 691 | | RS1/16S273J |
| R 692 | | RS1/16S512J |
| R 693 | | RS1/16S104J |
| R 694 | | RS1/16S104J |
| R 695 | | RS1/16S104J |
| R 696 | | RS1/16S104J |
| R 697 | | RS1/16S222J |
| R 698 | | RS1/16S222J |
| R 699 | | RS1/16S222J |
| R 701 | | RS1/16S104J |
| R 702 | | RS1/16S473J |
| R 703 | | RS1/8S433J |
| R 704 | | RS1/16S273J |
| R 705 | | RS1/16S473J |
| R 706 | | RS1/16S473J |
| R 707 | | RS1/4S103J |
| R 709 | | RS1/4S2R2J |
| R 710 | | RS1/4S2R2J |
| R 711 | | RS1/10S682J |
| R 716 | | RS1/16S104J |
| R 720 | | RS1/10S102J |
| R 721 | | RS1/16S223J |
| R 722 | | RS1/16S103J |
| R 723 | | RS1/16S223J |
| R 724 | | RS1/16S223J |
| R 730 | | RS1/10S223J |
| R 731 | | RS1/16S101J |
| R 732 | | RS1/4S221J |
| R 733 | | RS1/16S511J |
| R 734 | | RS1/16S681J |
| R 735 | | RS1/16S561J |
| R 736 | | RS1/16S103J |
| R 737 | | RS1/16S273J |
| R 738 | | RS1/16S473J |
| R 739 | | RS1/16S101J |
| CAPACITORS | | |
| C 101 | | CEV100M25 |
| C 102 | | CEV100M25 |
| C 103 | | CKSRYB222K50 |
| C 104 | | CKSRYB222K50 |
| C 105 | | CCSRCH331J50 |
| C 106 | | CCSRCH331J50 |
| C 107 | | CEV4R7M35 |
| C 108 | | CEV4R7M35 |
| C 109 | | CKSRYB473K16 |
| C 501 | | CKSQYB102K50 |
| C 502 | | CKSQYB102K50 |
| C 503 | | CKSRYB103K50 |
| C 601 | | CKSRYB104K16 |
| C 603 | | CKSRYB103K50 |
| C 605 | | CKSRYB103K50 |
| C 651 | | CKSRYB103K50 |
| C 701 | | CEAT471M16 |
| C 703 | | CEAT471M16 |
| C 704 | | CKSQYB224K16 |
| C 705 | | CEV220M6R3 |
| C 706 | | CKSRYB103K50 |
| C 707 | | CKSRYB473K16 |
| C 708 | | CEV4R7M25 |
| C 709 | | CKSRYB473K16 |
| C 710 | | CKSRYB473K16 |
| C 711 | | CKSRYB103K50 |
| C 712 | | CEV220M16 |
| C 713 | | CKSRYB473K16 |
| C 714 | | CEV220M6R3 |
| C 715 | | CKSRYB473K16 |
| C 720 | | CKSQYB334K16 |
| C 721 | | CKSRYB222K50 |

| Keyboard Unit |
|---|
| Consists of |
| Keyboard PCB |
| Switch PCB |

**B C** Unit Number : CWM6131
Unit Name : Keyboard Unit

MISCELLANEOUS

| | | | |
|---|---|---|---|
| IC | 901 | IC | BU2092FV |
| D | 901 | Diode | 1SS355 |
| D | 902 | Diode | 1SS355 |
| D | 903 | Diode | 1SS355 |
| D | 905 | LED | CL200PGCTU |
| D | 906 | LED | CL150DCD(AB) |
| D | 907 | LED | CL200PGCTU |
| D | 908 | LED | CL150DCD(AB) |
| D | 909 | LED | CL200PGCTU |
| D | 910 | LED | CL150DCD(AB) |
| D | 911 | LED | CL200PGCTU |
| D | 912 | LED | CL150DCD(AB) |
| D | 913 | LED | CL200PGCTU |
| D | 914 | LED | CL150DCD(AB) |
| D | 915 | LED | CL200PGCTU |
| D | 916 | LED | CL150DCD(AB) |
| D | 920 | LED | CL220PGC |
| D | 921 | LED | CL220PGC |
| D | 922 | LED | CL150PGCD(AB) |
| D | 923 | LED | CL150PGCD(AB) |
| D | 924 | LED | CL150PGCD(AB) |
| D | 925 | LED | CL150PGCD(AB) |
| D | 926 | LED | CL150PGCD(AB) |
| D | 927 | LED | CL150PGCD(AB) |
| D | 928 | LED | CL150PGCD(AB) |
| S | 901 | Switch | CSG1043 |
| S | 902 | Switch | CSG1043 |
| S | 903 | Switch | CSG1043 |
| S | 904 | Switch | CSG1043 |
| S | 905 | Switch | CSG1043 |
| S | 906 | Switch | CSG1043 |
| S | 907 | Switch | CSG1043 |
| S | 910 | Switch | CSN1033 |

RESISTORS

| | | |
|---|---|---|
| R | 901 | RS1/10S561J |
| R | 902 | RS1/10S561J |
| R | 903 | RS1/10S561J |
| R | 904 | RS1/10S561J |
| R | 910 | RS1/8S471J |
| R | 911 | RS1/8S471J |
| R | 912 | RS1/8S471J |
| R | 913 | RS1/8S471J |
| R | 914 | RS1/8S471J |
| R | 915 | RS1/8S471J |

| =====Circuit Symbol & No. | ===Part Name | Part No. |
|---|---|---|
| R 916 | | RS1/8S471J |
| R 917 | | RS1/8S471J |
| R 918 | | RS1/8S471J |
| R 919 | | RS1/8S471J |
| R 920 | | RS1/8S471J |
| R 921 | | RS1/8S471J |
| R 930 | | RS1/10S331J |
| R 932 | | RS1/10S181J |
| R 933 | | RS1/10S181J |
| R 934 | | RS1/8S471J |

CAPACITORS

| | | |
|---|---|---|
| C 901 | | CKSQYB104K16 |

**D** Unit Number : CWX2202
Unit Name : CD Core Unit(Servo Unit)

MISCELLANEOUS

| | | |
|---|---|---|
| IC 101 | IC | UPC2572GS |
| IC 201 | IC | UPD63702AGF |
| IC 301 | IC | BA5986FM |
| Q 101 | Transistor | 2SD1664 |
| Q 102 | Transistor | UMD2N |
| D 301 | Diode | 1SR154-400 |
| X 201 | Ceramic Resonator 16.934MHz | CSS1457 |
| EF 201 | Filter | CCG1076 |

RESISTORS

| | |
|---|---|
| R 101 | RS1/8S100J |
| R 102 | RS1/8S120J |
| R 104 | RS1/16S822J |
| R 105 | RS1/16S682J |
| R 106 | RS1/16S183J |
| R 107 | RS1/16S822J |
| R 108 | RS1/16S333J |
| R 109 | RS1/16S683J |
| R 110 | RS1/16S134J |
| R 111 | RS1/16S273J |
| R 112 | RS1/16S222J |
| R 113 | RS1/16S103J |
| R 114 | RS1/16S103J |
| R 115 | RS1/16S102J |
| R 116 | RS1/16S163J |
| R 117 | RS1/16S163J |
| R 120 | RS1/16S101J |
| R 121 | RS1/16S101J |
| R 125 | RS1/16S0R0J |
| R 201 | RS1/16S104J |
| R 202 | RS1/16S473J |
| R 203 | RS1/16S332J |
| R 204 | RS1/16S752J |
| R 205 | RS1/16S752J |
| R 206 | RS1/16S101J |
| R 250 | RS1/16S331J |
| R 251 | RS1/16S331J |
| R 252 | RS1/16S331J |
| R 253 | RS1/16S331J |
| R 254 | RS1/16S331J |
| R 255 | RS1/16S471J |
| R 256 | RS1/16S471J |
| R 259 | RS1/16S221J |
| R 263 | RS1/16S471J |
| R 269 | RS1/16S0R0J |
| R 274 | RS1/16S471J |
| R 277 | RS1/16S471J |
| R 301 | RS1/16S103J |
| R 302 | RS1/16S153J |
| R 303 | RS1/16S103J |

| =====Circuit Symbol & No. | ===Part Name | Part No. |
|---|---|---|
| R 304 | | RS1/16S273J |
| R 305 | | RS1/16S103J |
| R 306 | | RS1/16S752J |
| R 307 | | RS1/16S103J |
| R 308 | | RS1/16S103J |
| R 309 | | RS1/16S471J |
| R 311 | | RS1/16S471J |

CAPACITORS

| | |
|---|---|
| C 101 | CEV101M6R3 |
| C 102 | CKSQYB104K16 |
| C 103 | CEV470M6R3 |
| C 104 | CKSQYB334K16 |
| C 105 | CCSRCH240J50 |
| C 106 | CKSRYB222K50 |
| C 107 | CEV4R7M35 |
| C 108 | CKSRYB273K25 |
| C 109 | CCSRCH101J50 |
| C 110 | CKSQYB104K16 |
| C 111 | CKSRYB332K50 |
| C 112 | CKSQYB473K16 |
| C 113 | CKSRYB103K25 |
| C 114 | CKSRYB391K50 |
| C 115 | CCSRCH121J50 |
| C 116 | CKSRYB682K50 |
| C 117 | CKSRYB333K16 |
| C 118 | CKSQYB334K16 |
| C 119 | CKSQYB334K16 |
| C 120 | CKSQYB334K16 |
| C 121 | CKSQYB334K16 |
| C 122 | CKSQYB104K16 |
| C 123 | CKSRYB472K50 |
| C 124 | CKSQYB104K16 |
| C 125 | CCSRCH5R0C50 |
| C 126 | CKSRYB153K25 |
| C 127 | CKSRYB102K50 |
| C 201 | CKSQYB334K16 |
| C 202 | CKSQYB104K16 |
| C 203 | CKSQYB104K16 |
| C 204 | CKSRYB471K50 |
| C 207 | CKSQYB683K16 |
| C 208 | CKSRYB821K50 |
| C 209 | CKSRYB273K25 |
| C 210 | CKSQYB334K16 |
| C 211 | CKSQYB334K16 |
| C 212 | CKSQYB334K16 |
| C 213 22µF/6.3V | CCH1300 |
| C 301 | CEV101M10 |
| C 302 | CEV101M10 |

**G** Unit Number : CWX2203
Unit Name : CD Core Unit(STS Unit)

MISCELLANEOUS

| | | |
|---|---|---|
| IC 501 | IC | CXD2511R |
| IC 502 | IC | MSM514400DP-60TS |
| IC 601 | IC | AK4321VF |
| IC 701 | IC | BA05SFP |
| IC 801 | IC | LB1836M |
| IC 802 | IC | LB1836M |
| Q 801 | Transistor | DTA123JK |
| Q 802 | Transistor | UN2211 |
| D 701 | Diode | 1SR154-400 |
| D 702 | Diode | 1SR154-400 |

| =====Circuit Symbol & No.===Part Name | | | Part No. |
|---|---|---|---|
| D | 703 | Diode | 1SS355 |
| D | 704 | Diode | 1SS355 |
| D | 705 | Diode | 1SS355 |
| D | 706 | Diode | 1SS355 |
| D | 707 | Diode | 1SS355 |
| D | 708 | Diode | 1SS355 |
| S | 801 | Switch(LOAD) | CSN1052 |
| S | 802 | Switch(DOOR) | CSN1052 |
| S | 803 | Switch(MODE) | CSN1052 |
| EF | 701 | Filter | CCG1051 |
| EF | 702 | Filter | CCG1051 |

RESISTORS

| | | | |
|---|---|---|---|
| R | 501 | | RS1/16S102J |
| R | 502 | | RS1/16S202J |
| R | 503 | | RS1/16S392J |
| R | 504 | | RS1/16S822J |
| R | 505 | | RS1/16S163J |
| R | 506 | | RS1/16S512J |
| R | 507 | | RS1/16S182J |
| R | 508 | | RS1/16S222J |
| R | 509 | | RS1/16S102J |
| R | 510 | | RS1/16S102J |
| R | 511 | | RS1/16S102J |
| R | 512 | | RS1/16S102J |
| R | 513 | | RS1/16S102J |
| R | 514 | | RS1/16S471J |
| R | 601 | | RS1/16S101J |
| R | 602 | | RS1/16S101J |
| R | 603 | | RS1/16S471J |
| R | 604 | | RS1/16S471J |
| R | 701 | | RS1/10S0R0J |
| R | 702 | | RS1/10S100J |
| R | 716 | | RS1/16S471J |
| R | 717 | | RS1/16S471J |
| R | 718 | | RS1/16S471J |
| R | 801 | | RS1/10S102J |

CAPACITORS

| | | | |
|---|---|---|---|
| C | 501 | | CKSQYB334K16 |
| C | 502 | | CKSQYB334K16 |
| C | 503 | | CKSQYB334K16 |
| C | 504 | | CCSRCH471J50 |
| C | 506 | | CCSRCH221J50 |
| C | 601 | | CKSQYB334K16 |
| C | 602 | | CCSRCH221J50 |
| C | 603 | | CKSQYB334K16 |
| C | 604 | | CKSQYB334K16 |
| C | 605 | 22µF/6.3V | CCH1300 |
| C | 606 | | CKSQYB334K16 |
| C | 701 | 22µF/6.3V | CCH1300 |
| C | 702 | | CEVL101M6R3 |
| C | 703 | | CKSQYB334K16 |
| C | 704 | | CKSQYB334K16 |
| C | 801 | | CKSQYB104K25 |
| C | 802 | | CKSQYB104K25 |
| C | 803 | | CEVL220M16 |

**M** Unit Number :
Unit Name : PCB Unit(D)

| | | | |
|---|---|---|---|
| Q | 851 | Photo-transistor | CPT231SXTD |
| Q | 852 | Photo-transistor | CPT231SXTD |

**I** Unit Number :
Unit Name : PCB Unit(E)

| | | | |
|---|---|---|---|
| R | 856 | | RS1/8S911J |
| R | 857 | | RS1/8S821J |

| =====Circuit Symbol & No.===Part Name | | | Part No. |
|---|---|---|---|

**J** Unit Number :
Unit Name : PCB Unit(C)

| | | | |
|---|---|---|---|
| Q | 881 | Photo-transistor | CPT231SXTD |
| D | 883 | Chip LED | CL202IRXTU |
| S | 885 | Switch(MAX) | CSN1052 |

**L** Unit Number :
Unit Name : PCB Unit(A)

| | | | |
|---|---|---|---|
| D | 891 | Chip LED | CL202IRXTU |
| D | 892 | Chip LED | CL202IRXTU |

**H** Unit Number :
Unit Name : PCB Unit(B)

| | | | |
|---|---|---|---|
| S | 886 | Switch(ELV Home) | CSN1052 |
| S | 887 | Switch(Clamp) | CSN1051 |

**F** Unit Number :
Unit Name : Motor PCB(A)

| | | | |
|---|---|---|---|
| Q | 1 | Photo-interrupter | RPI-221 |
| M | 1 | Motor Unit(Cam Gear) | CXB3174 |
| M | 3 | Motor Unit(ELV) | CXB3175 |

**E** Unit Number :
Unit Name : Motor PCB(B)

| | | | |
|---|---|---|---|
| M | 4 | Motor Unit(Carriage) | CXB3178 |
| M | 5 | Motor(Spindle) | CXM1120 |

**K** Unit Number :
Unit Name : Load Motor PCB

| | | | |
|---|---|---|---|
| M | 2 | Motor Unit(Load) | CXB3177 |

Miscellaneous Parts List

| | | | |
|---|---|---|---|
| | | Pickup Unit(Service)(P8) | CXX1311 |

# 6. ADJUSTMENT

## CHECKING THE GRATING AFTER CHANGING THE PICKUP UNIT

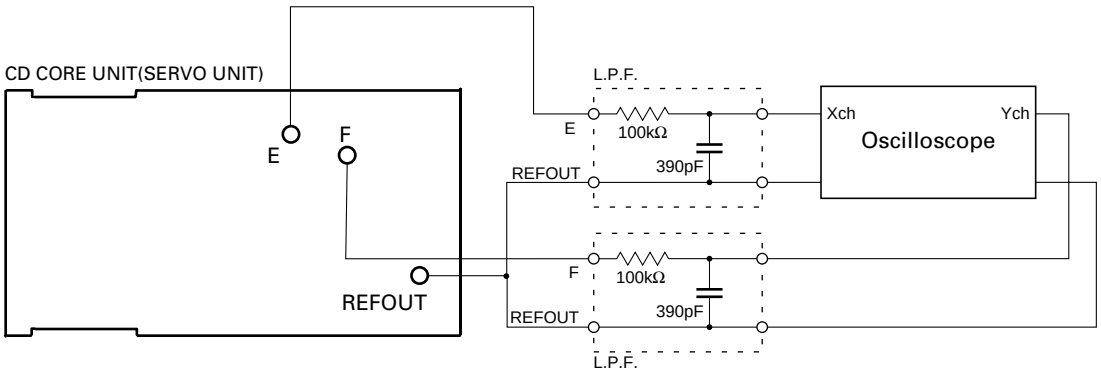
• **Note :**
The grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

• **Purpose :**
To check that the grating is within an acceptable range when the PU unit is changed.

• **Symptoms of Mal-adjustment :**
If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or taking a long time for track searching.

• **Method :**

| | |
|---|---|
| • Measuring Equipment | • Oscilloscope, Two L.P.F. |
| • Measuring Points | • E, F, REFOUT |
| • Disc | • ABEX TCD-784 |
| • Mode | • TEST MODE |




• **Checking Procedure**

1. In test mode, load the disc and switch the 5V regulator on.
2. Using the TRK+ and TRK- buttons, move the PU unit to the innermost track.
3. Press key **F9** to close focus, the display should read "91". Press key **F8** to implement the tracking balance adjustment the display should now read "81". Press key **F9** 4 times. The display will change, returning to "81" on the fourth press.
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75° . Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75° try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75° then the mechanism should be judged to be at fault.

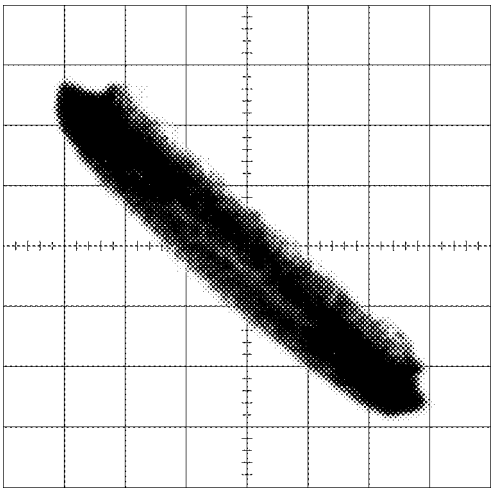
• **Note**
Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" ( the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

• **Hint**
Reloading the disc changes the clamp position and may decrease the "wobble".

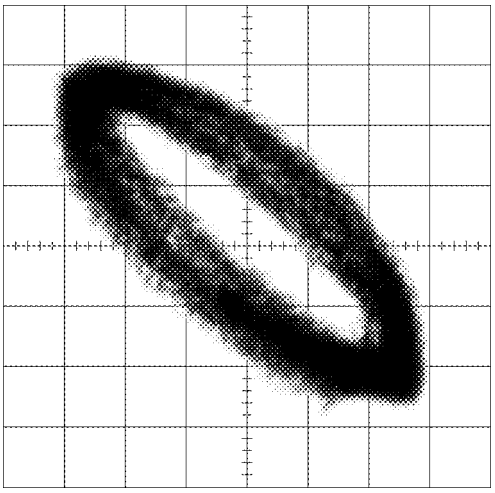
**Grating waveform**

Ech → Xch 20mV/div, AC
Fch → Ych 20mV/div, AC

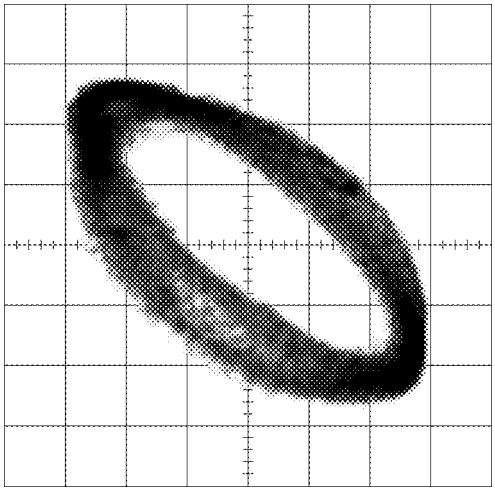
0°



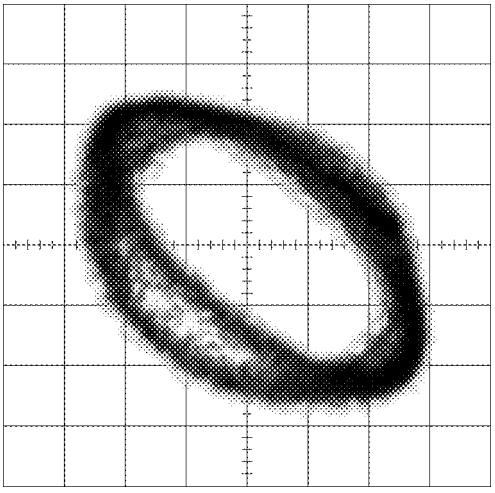
30°



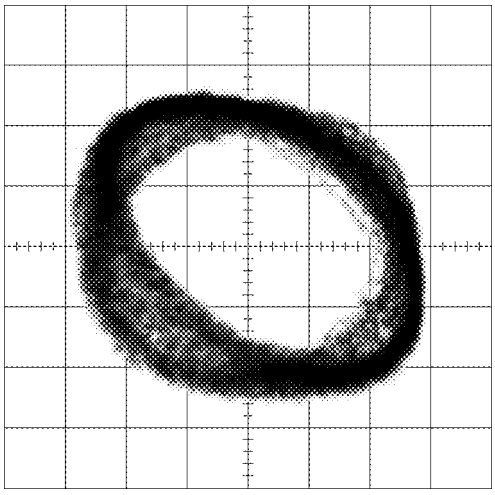
45°



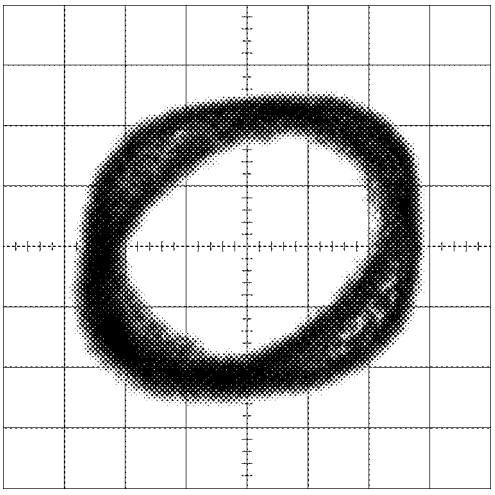
60°



75°



90°



# 7. GENERAL INFORMATION

## 7.1 DIAGNOSIS

### 7.1.1 TEST MODE

**● CD Test Mode**

1) Precautions on Adjustment

- The unit employs a single voltage (+5V) for the regulator, thus the reference potential of the signal is RFOUT (approximately 2.5V) rather than GND.
  Inadvertent contact of REFOUT and GND during adjustment can result not only in disabling normal potential measurement but also in exposing the pick-up to strong impacts due to malfunctioning of the servo. Therefore, you are requested to observe the following precautions.
- Make sure that the negative probe of the measuring instrument is not connected to RFOUT or GND. Special care must be exercised so that the channel 1 negative probe may not be connected to the oscilloscope and the channel 2 negative probe to GND. Since the frame of the measuring instrument is usually at the same potential as the negative probe, the frame of the measuring instrument must be changed to floating status.
  When RFOUT is inadvertently connected to GND, you must immediately turn off the regulator or power supply.
- The regulator must be turned off before mounting or dismounting filters or wiring materials.
- You should not start adjustment or measurement immediately after the regulator is turned on. It is recommended to run the player for approximately one minute so that it may stabilize.
- When the test mode is turned on, various protective functions from the software become unavailable. Thus, you must make sure that undesirable electric or mechanical shocks are not be given to the system.
- This model employs a photot-ransistor for detecting discs at their loading or ejection. Thus, if its outer case is removed during repair work and internal parts are exposed to light of strong intensity, malfunctions including the following can result:
  * The eject button becomes inoperable during play. Pressing the eject button does not eject a disc and play is continued.
  * Loading becomes unavailable.

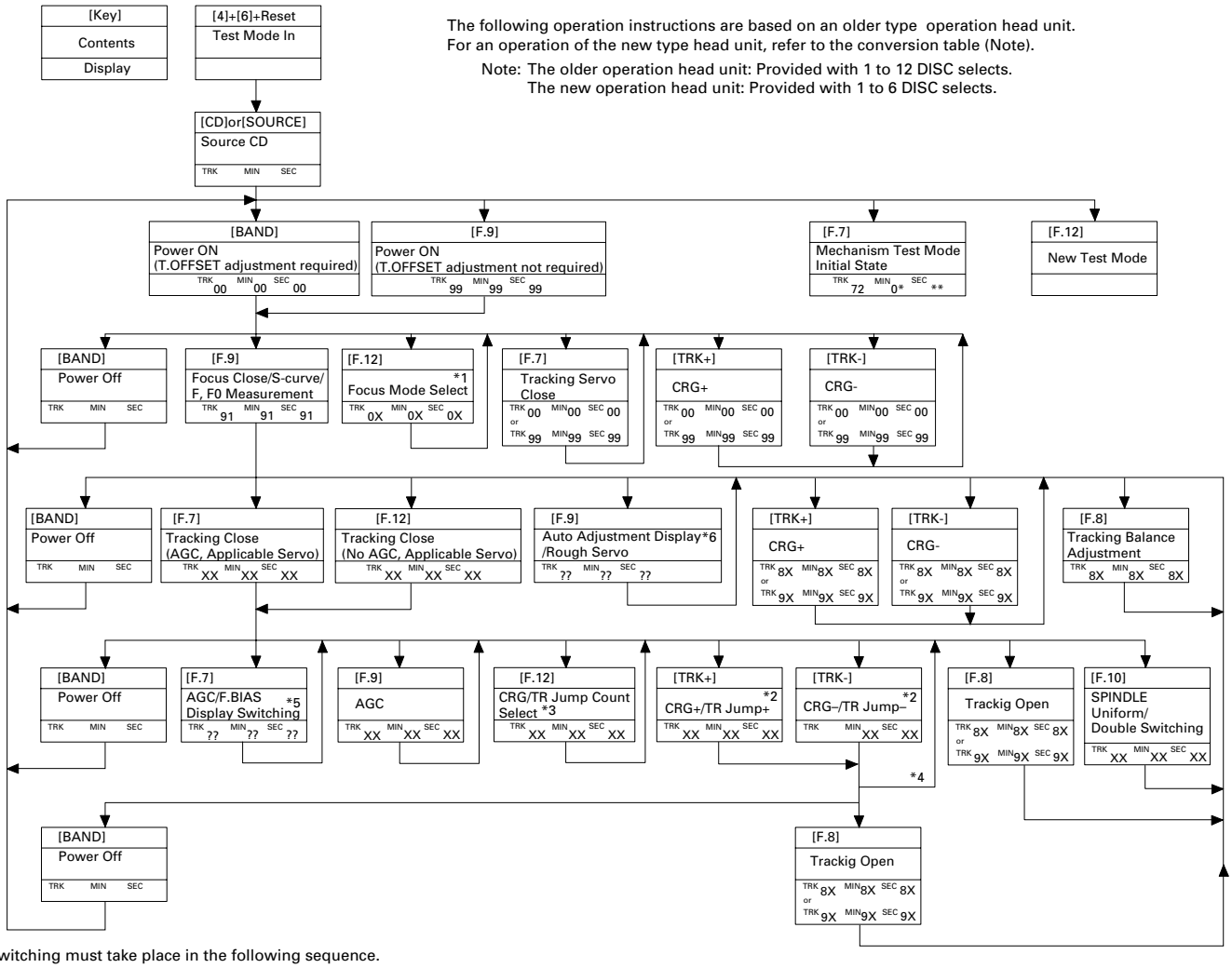
  If a malfunction is recognized, appropriate remedial actions must be taken. Such actions include changing the light source position, changing the unit position and applying a cover to the photo-transistor.
- When you press the EJECT key to eject a disc, you must not touch any other key until the ejection is complete.
- If you press the TRK+ or TRK– for the focus search in the test mode, you must turn the power off immediately. (Otherwise, the lens will be forced to stick to the top or bottom, potentially resulting in the burning of the actuator.)

2) Description of the Test Mode

Adjustment of this unit is done in parallel with the CD control unit (KEH-P7000 or a head unit conforming to the IP-BUS specifications), thus key operations for adjustments are done from the unit. Taking the example of the KEH-P7000, the following describes how to turn on the test mode and operate the keys. The keys referred to in the following are those used on the KEH-P7000.

- Turning on the Test Mode
  Press the [4] and [6] keys simultaneously to turn on the ACC and the backup.
- Ending the Test Mode
  Apply the reset (the reset will be applied two minutes after the power is turned from off).
- Operation of TR JUMPs (except 100TR) continues after your finger has left the key. CRG, MOVE and 100TR JUMP are forced to the tracking close mode as soon as the key is released.
- Turning the power on or off resets the JUMP MODE to the Single TR.

## ● CD Player Flowchart




The following operation instructions are based on an older type operation head unit.
For an operation of the new type head unit, refer to the conversion table (Note).

Note: The older operation head unit: Provided with 1 to 12 DISC selects.
The new operation head unit: Provided with 1 to 6 DISC selects.

Switching must take place in the following sequence.

*1) Switching must take place in the following sequence.

Focus Close (TRK 00 MIN 00 SEC 00) / (TRK 99 MIN 99 SEC 99) → S.Curve Check TRK 01 MIN 01 SEC 01 → Focus EQ Measurement. TRK 02 MIN 02 SEC 02

*2) Single TR /4TR / 10TR / 32TR / 100TR

*3) Switching must take place in the following sequence.

Single TR 9X(8X):91(81) → 4 TR 92(82) → 10 TR 93(83) → 32 TR 94(84) → 100 TR 95(85) → CRG Move 96(86)

*4) It applies to the CRB Move and 100TR Jump alone.

*5) Switching must take place in the following sequence.

Min/Sec (or Track No.) → F.AGC Gain → F.AGC Gain → F. BIAS Setting

(AGC Gain = (Current value/Initial value) x 20)

*6) Switching must take place in the following sequence.

F.Cancel Display → T.Offset Display → T.Bal Display → Rough Servo.

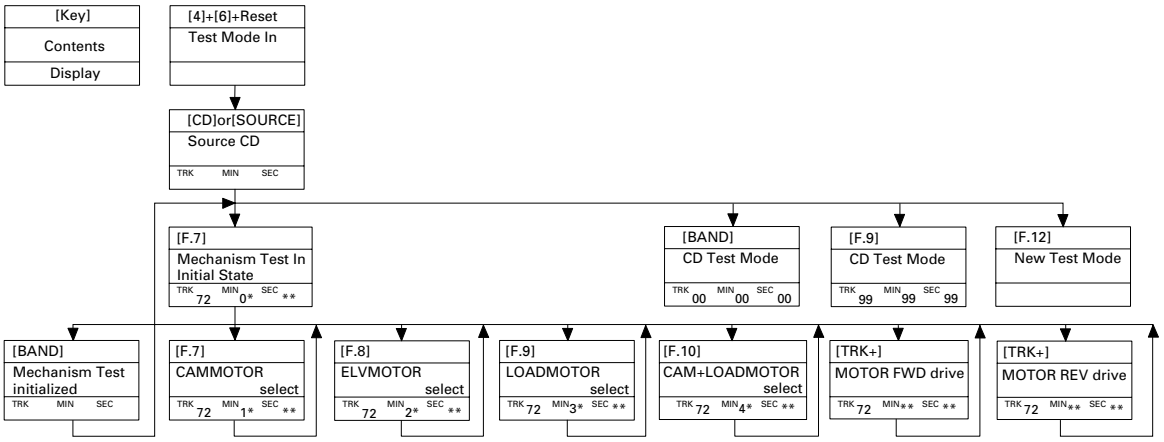
(F.Bias value, F.Cancel value, T.Offset value, T.Bal value
= (Upper 8 bits of the setting (7F[H] to 80[H] + 128)/4
= 63[D] to 32[D] to 00[D]).

| [Key] Older unit | [Key] New unit | Operation | |
|---|---|---|---|
| | | Test Mode | New Test Mode |
| [BAND] 15 00H | [BAND] 15 00H | Power ON/OFF | Error occurrence time/ Cause display switching |
| [TRK+] 15 01H | [TRK+] 15 01H | CRG+/TR Jump+ (Toward outer perimeter) | Track+/FF |
| [TRK-] 15 02H | [TRK-] 15 02H | CRG-/TR Jump- (Toward inner perimeter) | Track-/REV |
| [F.7] 15 03H | [1] 15 03H | Tracking Close/AGC gain, F.Bias adjustment value display switching | — |
| [F.8] 15 04H | [2] 15 04H | Auto Tracking Balance adjustment/ Tracking Open | Mode |
| [F.9] 15 05H | [3] 15 05H | Focus Close, S.Curve, F.EQ measurement/ Rough Servo/AGC | — |
| [F.10] 15 06H | [4] 15 06H | Focus Open | RAMDOM |
| [F.11] 15 07H | [5] 15 07H | Jump Off | — |
| [F.12] 15 08H | [6] 15 08H | Focus Mode select/Tracking Close/ CRG*TR Jump Switching | Auto/Manual switching |

- Operation of TR JUMPs other than 100TR is continued after your finger has left the key.
  CRG Move and 100TR Jump are forced to the Tracking Close Mode when the key is released.
- Powering on or off resets the Jump Mode to the Single TR (9).
- When ending the test mode, apply the reset (the reset is applied in two minutes from powering off).

Note: The IP-BUS head unit must be employed for controlling the test mode.
Note: Sound is unavailable even after the tracking has been closed
(this trouble results when the IC for the STS is not controlled in the test mode).
Note: When you pressed the [TRK+] or [TRK-] key during the Focus Search, you must turn the power off immediately
(otherwise, the lens can stick resulting in actuator damages).

## ● CD Changer Mechanism Flowchart

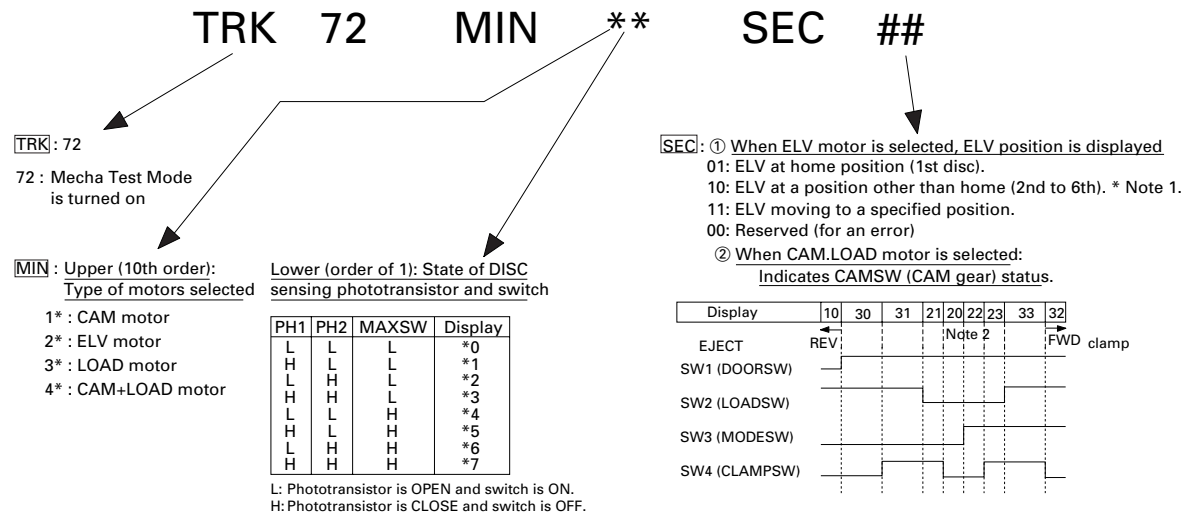



❑ Operating Procedures:

1) Turn on the CD Test Mode, then select the CD-MULTI for the SOURCE.
2) Press [F.7] to turn on the Mecha Test Mode.
3) Select the motor to be driven using the [F.7] to [F.10] keys. ( TRK 72 MIN X* SEC **)
4) Press the [TRK+] or [TRK–] in this state to drive the selected motor.

| [Key] Older unit | [Key] New unit | Operation |
|---|---|---|
| [BAND] 15 00H | [BAND] 15 00H | Mechanism Test is initialized. |
| [TRK+] 15 01H | [TRK+] 15 01H | Valid only when the motor selected (using the [F.7] to [F.10] keys) is driven in FWD direction. |
| [TRK–] 15 02H | [TRK–] 15 02H | Valid only when the motor selected (using the [F.7] to [F.10] keys) is driven in REV direction. |
| [F.7] 15 03H | [1] 15 03H | CAMMOTOR is selected. |
| [F.8] 15 04H | [2] 15 04H | ELVMOTOR is selected. |
| [F.9] 15 05H | [3] 15 05H | LOADMOTOR is selected. |
| [F.10] 15 06H | [4] 15 06H | CAM + LOADMOTOR is selected. |

<Screen Display during Mecha Test Mode>


TRK 72 MIN ** SEC ##
TRK : 72
72 : Mecha Test Mode is turned on
MIN : Upper (10th order): Type of motors selected
1* : CAM motor
2* : ELV motor
3* : LOAD motor
4* : CAM+LOAD motor
Lower (order of 1): State of DISC sensing phototransistor and switch
SEC : ① When ELV motor is selected, ELV position is displayed
01: ELV at home position (1st disc).
10: ELV at a position other than home (2nd to 6th). * Note 1.
11: ELV moving to a specified position.
00: Reserved (for an error)
② When CAM.LOAD motor is selected:
Indicates CAMSW (CAM gear) status.
Display 10 30 31 21 20 22 23 33 32
EJECT
REV
Note 2
FWD clamp
SW1 (DOORSW)
SW2 (LOADSW)
SW3 (MODESW)
SW4 (CLAMPSW)

| PH1 | PH2 | MAXSW | Display |
|---|---|---|---|
| L | L | L | *0 |
| H | L | L | *1 |
| L | H | L | *2 |
| H | H | L | *3 |
| L | L | H | *4 |
| H | L | H | *5 |
| L | H | H | *6 |
| H | H | H | *7 |

L: Phototransistor is OPEN and switch is ON.
H: Phototransistor is CLOSE and switch is OFF.

An example when TRK 72, MIN 10 and SEC 31:

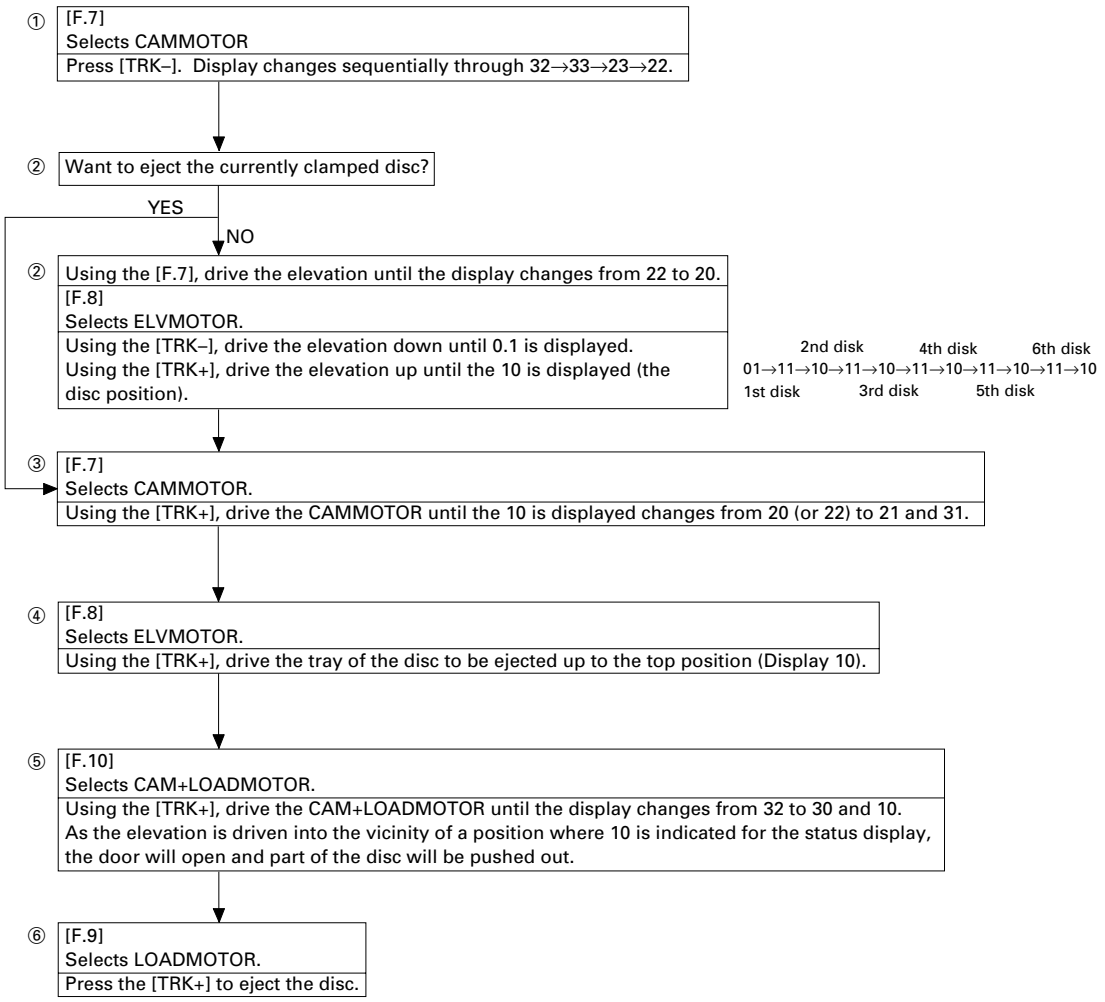
Test Mode is turned on from TRK 72.
CAMMOTOR is selected from 1 of MIN 10 and PH1/PH2 are selected from 0. All MAX switches are set to L (low).
As for SEC 31, since CAMMOTOR is selected from MIN, CAM gear CLAMP switch is set to L (low) and others are H (high) from SEC①.

❑ Precautions

* The keys are inoperable as long as operation of the mechanism is continued.
* When driving the CAMMOTOR in 31 → 30 → 10 (in REV direction), the elevation position must be at the EJECT/LOAD position (the top position).

Note 1: When the elevation is situated at the Note 1 position, move of any motor other than the REV is disabled.
Note 2: Before performing the elevation, make sure that the CAM SW (switch) is set to a position between 22 and 20.
As a rule, driving of the ELV MOTOR must be started immediately after the CAMSW indication has changed from 22 to 20.

❍ Operating Procedures for Ejecting a Clamped Disc


①
[F.7]
Selects CAMMOTOR
Press [TRK–]. Display changes sequentially through 32→33→23→22.
②
Want to eject the currently clamped disc?
YES
NO
②
Using the [F.7], drive the elevation until the display changes from 22 to 20.
[F.8]
Selects ELVMOTOR.
Using the [TRK–], drive the elevation down until 0.1 is displayed.
Using the [TRK+], drive the elevation up until the 10 is displayed (the disc position).
2nd disk 4th disk 6th disk
01→11→10→11→10→11→10→11→10→11→10
1st disk 3rd disk 5th disk
③
[F.7]
Selects CAMMOTOR.
Using the [TRK+], drive the CAMMOTOR until the 10 is displayed changes from 20 (or 22) to 21 and 31.
④
[F.8]
Selects ELVMOTOR.
Using the [TRK+], drive the tray of the disc to be ejected up to the top position (Display 10).
⑤
[F.10]
Selects CAM+LOADMOTOR.
Using the [TRK+], drive the CAM+LOADMOTOR until the display changes from 32 to 30 and 10.
As the elevation is driven into the vicinity of a position where 10 is indicated for the status display, the door will open and part of the disc will be pushed out.
⑥
[F.9]
Selects LOADMOTOR.
Press the [TRK+] to eject the disc.

① Select CAMMOTOR using [F.7], then press the [TRK–] while the disc is being clamped (CAMSW state is 32).
The CAMSW status indication sequentially changes through 32→33→23→22.
② When the disc to be ejected is not identical with the disc being clamped, select the [F.8] ELVMOTOR in the vicinity of where the display changes from 22 to 20, then match the elevation to the disc to be ejected according to the following procedures:
After selecting ELVMOTOR, lower the elevation until the ELV position display becomes 01 (1st disc) using the [TRK-].
Drive the elevation up until the display is changed to 10. This is the elevation where the second disk is situated.
The next display of 10 tells you the elevation of the 3rd disc. Repeating this operation allows you to establish an elevation matching each disc. (When the elevation is driven from the 1st through 6th disc, the status display changes as 01→11→10→11→10→11→10→11→10→11→10.)
(When the disc to be ejected coincides with the disc being clamped, the above operations are not necessary.)
③ Select the [F.7] CAMMOTOR and then, using the [TRK+], drive it until the display changes from 20 (or 22) to 21 and 31.
④ Select the [F.8] ELVMOTOR, then drive the tray of the disc to be ejected up to the EJECT/LOAD position (using the [TRK+]).
⑤ Select the [F.10] CAM+LOADMOTOR, then drive it in the REV direction until the display changes from 31 to 30 and 10.
The door will open immediately before the display changes to 10 and part of the disc will be pushed out.
⑥ When 10 is displayed, select the [F.9] LOADMOTOR, then drive it in REV direction until the disc is completely ejected.

## ● New Test Mode

Principally, discs are played normally in this test mode.

When the test mode has been turned on, it will indicate when (in absolute time) and why an error occurred. Errors include off-focus, spindle lock disengagement, unavailability of sub-code reading and sound skipping.

While the test mode setup is taking place, operational status (Internal RAM: CPOINT) of the CD control software is displayed.

(1) Turning On the New Test Mode

Refer to the Test Mode Flowchart on page 49.

(2) Cause-of-Error (Error No.) Codes

| Error code | Category | Troubles | Description/Cause(s) |
|---|---|---|---|
| 40 | Electric system | Off-focus | FOK = LOW has continued for 100 msec. or more.<br>→ Due to scratches, stains, vibrations, servo failure, etc. |
| 41 | Electric system | Spindle lock disengagement | LOCK = LOW has continued for 100 msec. or more.<br>→ Due to scratches, stains, vibrations, servo failure, etc. |
| 42 | Electric system | Unavailability of sub-code reading | Sub-code was unreadable for 500 msec.<br>→ Due to scratches, stains, vibrations, servo failure, etc. |
| 43 | Electric system | Sound skipping | Last address memory has been activated.<br>→ Due to scratches, stains, vibrations, servo failure, etc. |

* The error codes are displayed in the same manner as in the normal mode.

(3) Display of Operational Status During Setup

| Status No. | Contents | Protective Action |
|---|---|---|
| 01 | Carriage returning to home position | None |
| 02 | Carriage moving to inner perimeter | 10-second time-out, failure on home switch. |
| 03 | Carriage moving to outer perimeter | 10-second time-out, failure on home switch. |
| 05 | Carriage outer perimeter feed (1 second) taking place | None |
| 11 | Setup started | None |
| 12 | Spindle rotation<br>Focus search started | None |
| 13 | Waiting for focus close (XSL = L) | Focus close not available |
| 10 | Waiting for focus close (FOK = H)<br>(When AGC has not been conducted) | Improper focus close |
| 14 | Waiting for focus close (FOK = H)<br>(When AGC has already been conducted) | Improper focus close |
| 15,16,17 | Focus CLOSE<br>Tracking OPEN | Off-focus |
| 18 | Focus AGC in progress | Off-focus |
| 19 | Tracking AGC in progress | Off-focus |
| 20 | Waiting for MIRR, LOCK and sub-code.<br>Carriage close, servo applicable to CLV. | Off-focus, failure on MIRROR, spindle lock unavailable, sub-code unreadable. |

* "Setup" denotes a series of operations from establishing the focus up to playing a disc.

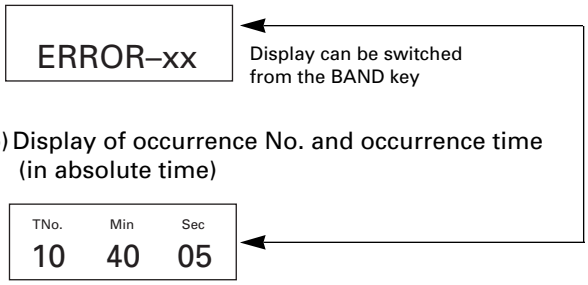
(5) LCD Display Example

• While the setup is in progress
8-digit indication LCD

• The operation mode (PLAY, SEARCH, etc.) is identical with the normal mode.

• When a protection/error has occurred (8-digit indication LCD)

(a) Error display


ERROR–xx
Display can be switched from the BAND key
(b) Display of occurrence No. and occurrence time (in absolute time)
TNo. Min Sec
10 40 05

## ● Error No. Display

The error mode is turned on if a CD player becomes not playable or is forced to halt due to an error. Cause(s) of an error will be indicated with numerical characters. The error-number-display function is intended to facilitate the error analysis and resulting repair work.

(1) Basic Display Means

• Display examples: E-XX (4-digit), ERR-XX (6-digit) and ERROR-XX (8-digit)

(2) Error Code

| Error code | Category | Troubles | Description/Cause(s) |
|---|---|---|---|
| 10 | Electricity | Carriage home error | Unable to move to or from inner perimeter<br>→ Failure on home switch or carriage move trouble. |
| 11 | Electricity | Focus search error | Unable to set a focus<br>→ Scratches or stains on backside of the disc, severe vibrations, CD-R is not written to the disc (it can happen on the backside of the disc). |
| 12 | Electricity | Spindle lock error<br>Sub-code error | Spindle lock unavailable, sub-code unreadable<br>→ Failure on spindle, scratches on the disc, stains or strong vibrations. |
| 14 | Electricity | Mirror error | MIRR signal error continues for 500 msec or more<br>→ Stains on the disc or strong vibrations. |
| 17 | Electricity | Setup error | AGC protection cannot be turned on in time or focus can be easily lost<br>→ Scratches or stains on the disc or strong vibrations. |
| 19 | Electricity | Setup error | Tracking error level is low or tracking balance adjustment is unavailable<br>→ Failure on the pickup or tracking-error circuit. |
| 30 | Electricity | Search time-out | Target address can't be reached<br>→ Failure on the carriage/tracking or scratches on the disc. |
| A0 | System | Error on power supply | Ground fault of power supply (VD)<br>→ Failure on switching transistor or failure of power supply. |

| Code | Name | Description |
|---|---|---|
| 20 | Door OPENING | While the mechanism is in operation, should have been closed a door was opened. |
| 21 | Roller OFF time-out | 4 seconds have elapsed before completing the roller OFF (the cam gear has not been rotated to the roller-OFF end position). |
| 22 | Roller SET time-out | 4 seconds have elapsed before completing the roller SET. |
| | (Roller OFF time-out) | (During the roller OFF operation, 4 seconds have elapsed while the cam gear is rotating in REV direction.) |
| 23 | Door CLOSING | Door can't be closed when the roller OFF has ended. |
| 24 | Cam started from invalid position | The cam gear attempted to do roller OFF/roller SET from an invalid position. |
| 26 | Foreign substance on phototransistor (before closing the door) | Foreign substance was found on the phototransistor when closing the door after the loading is complete. An error will be indicated if the disc is still caught by the phototransistor after 4 seconds of forced eject. |
| 29 | Roller being caught | Although the cam gear has been rotated up to the roller OFF end position, the roller can't be moved to the standby position. |
| 41 | Lift DOWN time-out | 4 seconds have elapsed before completing the lift DOWN operation. |
| 42 | Lift UP time-out | 4 seconds have elapsed before completing the lift UP operation. |
| | (Lift DOWN time-out) | (During the lift DOWN operation, 4 seconds have passed with the cam gear rotating in REV direction.) |
| 45 | Lift DOWN cam displacement | The lift DOWN complete cam gear has been displaced from its specified position. |
| 52 | EJECT time-out | 8 seconds have elapsed before completing the EJECT operation. An error will be indicated if the disc is still caught by the phototransistor after 4 seconds of forced eject. |
| 55 | HOME SW ON after forced EJECT | HOME SW was still at ON position after 4 seconds of forced eject. |
| 57 | Phototransistor being caught after forced EJECT | When forced eject was employed for the Bup failure during loading or ejection,an error will be indicated if the disk is still caught by the phototransistor after 4 seconds of forced eject. |
| 61 | CRGIN time-out | 10 seconds have elapsed before completing CRGIN operation. |
| | (CRGOUT time-out) | (During CRGOUT operation, 10 seconds have elapsed with the cam gear rotating in REV direction.) |
| 62 | CRGOUT time-out | 10 seconds have elapsed before completing the CRGOUT operation. |
| 65 | CRGOUT cam displacement | Position of the CRGOUT complete cam gear has been displaced. |
| 71 | ELVUP time-out | 2 seconds have elapsed before completing 1-stage UP. |
| 72 | ELVDN time-out | 2 seconds have elapsed before completing 1-stage DOWN. |
| 74 | ELV displacement | At the start of ELV, ELVSNS was not set to low. (In case of starting from the 1st floor, ELHOME was not set to low.) |
| 75 | ELV counting error | HLHOME was set to low though not on the 1st floor. (There is a conflict between the floor number stored on the microcomputer and the actual floor number.) |
| 91 | LOAD time-out | 8 seconds have elapsed before completing the LOAD. An error will be indicated if the disc is still caught by the phototransistor after 4 seconds of forced eject. |
| 96 | Settlement of foreign substance | Unauthorized foreign substance such as 8 cm disc has been loaded. An error will be indicated if the disc is still caught by the phototransistor after 4 seconds of forced eject. |

## 7.1.2 DISASSEMBLY

### ● Removing the upper case (not shown)

1. Remove the five screws, then remove the upper case.

### ● Removing the Extend Unit (Fig. 1)

1. Remove the three screws B, then remove the side frame and holder.
2. Remove screw C, screw D and PCB from the connector.
3. Straighten the three currently bent claws, then remove the extend unit.

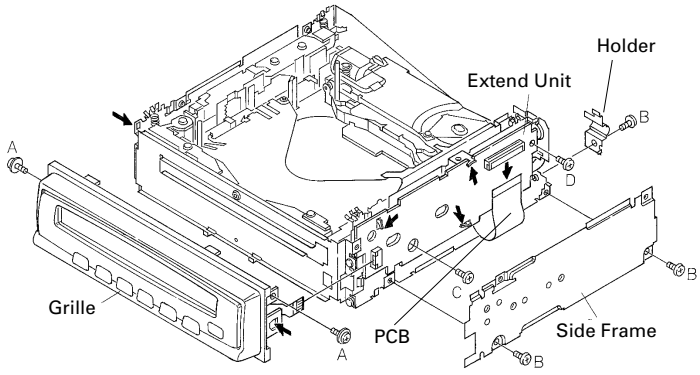



Fig. 1

### ● Removing the Grille Assy (Fig. 1)

1. Remove the two screws A and the connector, then remove the grille assy.

### ● Removing the CD Mechanism Module (Fig. 2)

1. Remove the three screws A, then remove the front frame.
2. Remove the three screws B and two screws C, then remove the damper and holder.
3. Remove the two spring Ⓐs, spring Ⓑ and spring Ⓒ from the hook, then remove the CD mechanism module.

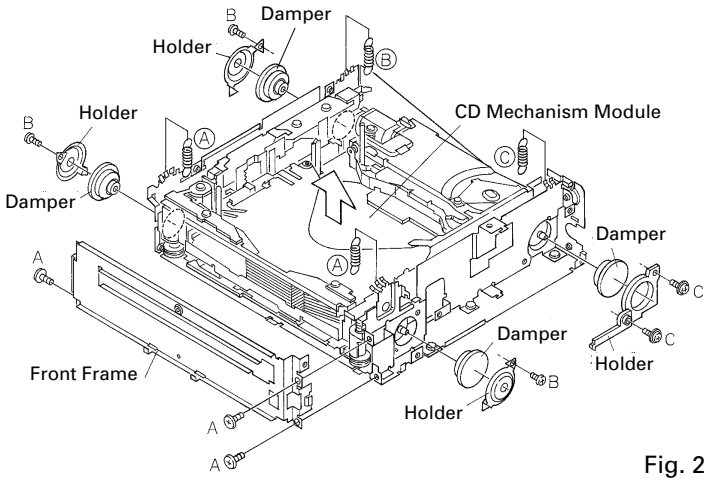



Fig. 2

– Precautions on Assembly –

Apply spring Ⓒ (black) to the front side hook.

Remaining springs Ⓐ and Ⓑ are to be hung on the center hook.

### ● Removing the Keyboard PCB (Fig. 3)

1. Remove screws A and B, then remove the switch PCB.
2. Remove the four screws D, then remove the guide.
3. Remove the three screws C, then remove the keyboard PCB.

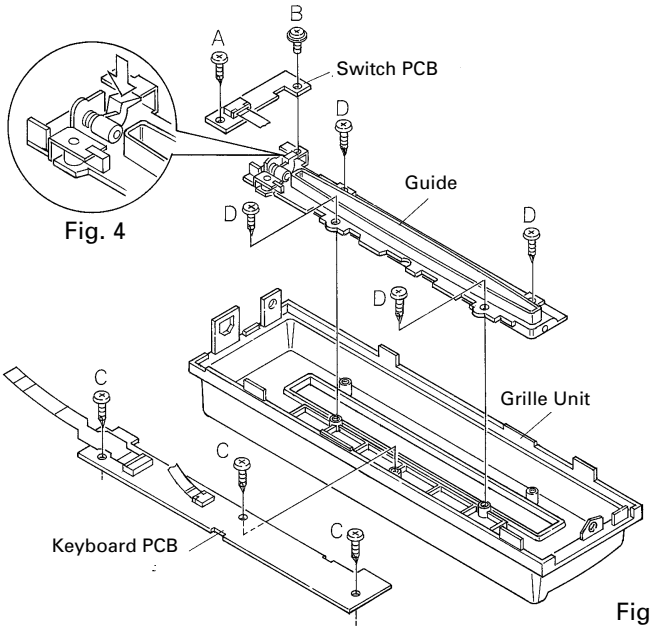



Fig. 3

– Precautions on Assembly (Fig. 4) –

When mounting the switch PCB, lower the white lever so as to prevent the switch arm from bending.

Fig. 4

## ● How to remove the Tray Assy

1. Apply about 6V current to the Cam gear motor until all holes match at the position (A) (elevation OK position).
2. Hook the three springs B temporarily as shown in Fig. 5. While pushing the Tray holder lock arms (right and left) in the direction (C), remove the Tray holder.
3. Lift up the Tray assy to remove it.

* Be careful not to remove the Tray hooks from the Tray assy.

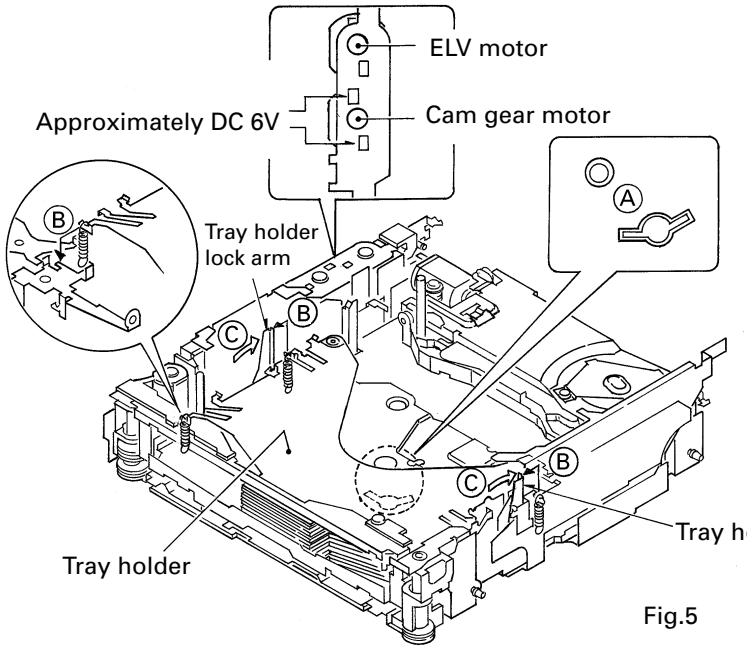



Fig.5

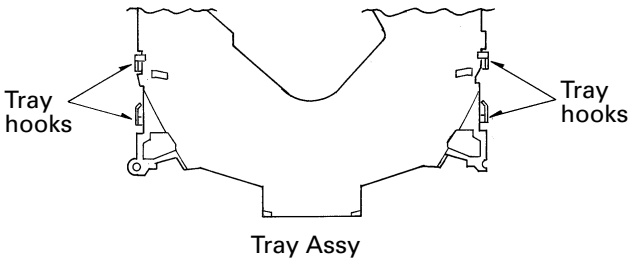



Fig. 6

## ● How to remove the Carriage Mech Assy

1. Insert a short pin into the flexible PCB of the Pickup unit.
2. While opening the resin hooks, remove the cover from the Servo unit.
3. Disconnect the flexible PCBs from the connectors CN101 and CN301.
4. Remove the Tray holder and the Tray assy. (See above)
5. Rotate the Cam gear motor until the positions of all holes (E) match, then stop the motor.
   (The Carriage Mech assy will stop as shown in the Fig.7.)

* When the positions of all holes match, they will be completely covered by the Carriage mech assy.

* To rotate the Cam Gear motor, see "How to remove the Tray assy".

6. Unhook the spring A.
7. Remove the flexible holder B (while opening the hooks).
8. Remove the flexible PCB (C) from the motor. (The flexible PCB (C) has been stuck on the motor with double-sided adhesive tape.)
9. Loosen the fixing screw and remove the flexible holder.

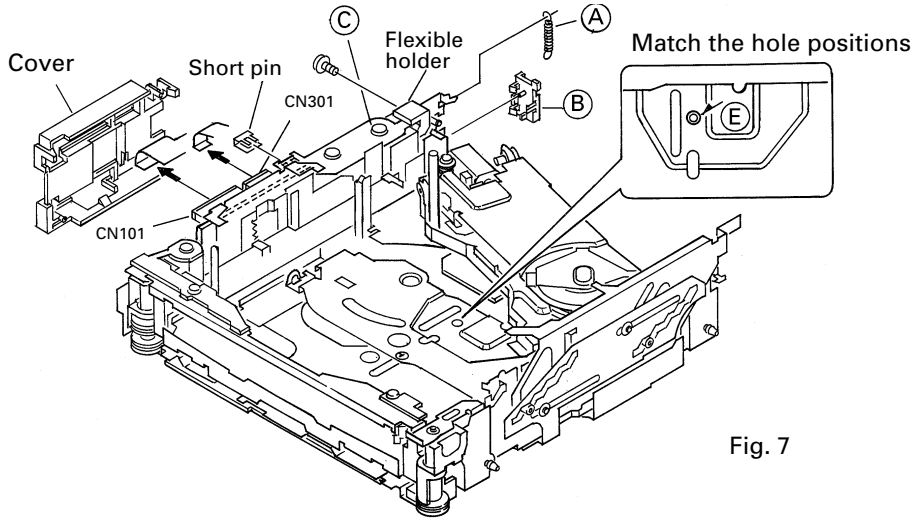



Fig. 7

10. Remove the screw, pressure spring and collar. Lift up the Carriage mechanism assy to remove it.
    * Screw tightening torque: 2.6kgfcm

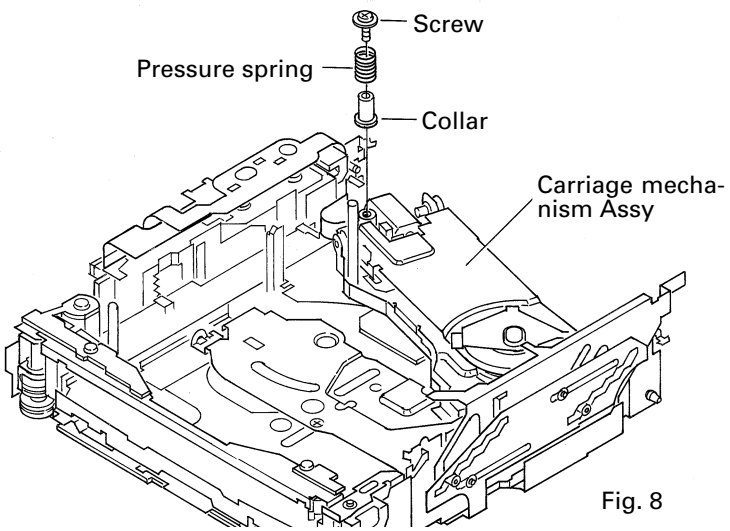



Fig. 8

## ● How to remove the Pickup unit

1. Remove the pulling spring, torsion spring and E-shaped ring. Then remove the Clamper arm.

* The spring (A) will be removed with the Clamper arm.

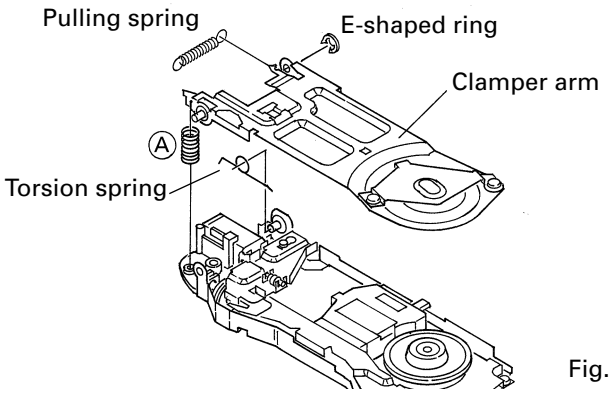



Fig. 9

2. Slide the Clamp UP lever (B) to remove it.
3. Loosen the 2 screws. Remove the feed-screw cover by sliding it.
4. Remove the feed-screw pressure spring (D).
5. Loosen the 2 screws. Remove the feed-screw holder (E).
6. Remove the belt.
7. Remove the Pickup unit together with the feed screw.

* Be careful not to lose the shaft holders at the both ends of the feed screw.
* Be careful not to damage the 2 flexible PCBs(for the Pickup and motor) when separating them. The flexible PCBs have been stuck each other with double-sided adhesive tape.

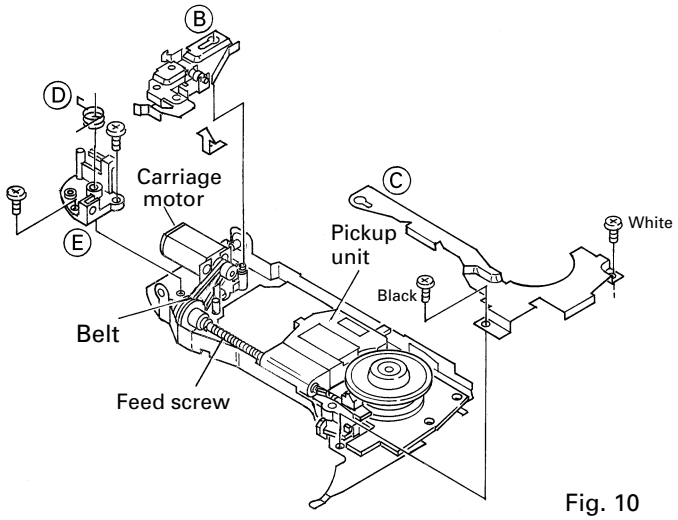



Fig. 10

8. Loosen the 2 screws. Remove the plate spring and the rack.
9. Pull out the feed screw from the Pickup unit.

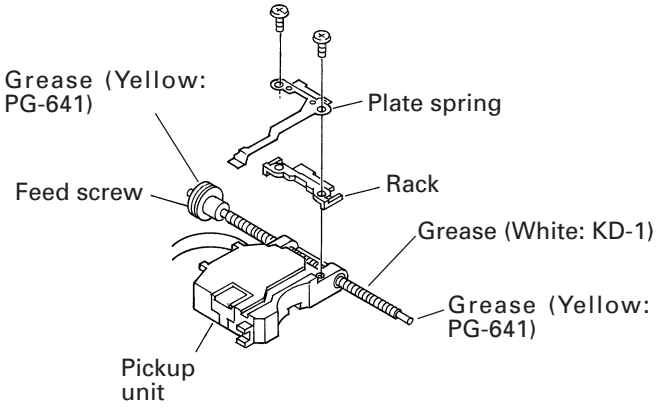



Fig. 11

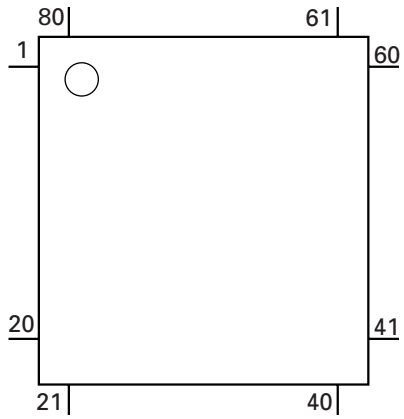
## 7.2 IC

● **Pin Functions (PD5465A)**

| Pin No. | Pin Name | I/O | Function and Operation |
|---|---|---|---|
| 1 | VDIN | I | VD power supply sensor input |
| 2 | DOORSW | I | Door open position sense input |
| 3 | IPIN | I | IP-BUS data input |
| 4 | IPOUT | O | IP-BUS dada output |
| 5 | CLMPSW | I | Disk clamp sense input |
| 6 | ELHOME | I | Elevation sense input |
| 7 | XSCK | O | LSI clock output |
| 8 | XSO | O | LSI data output |
| 9 | XSI | I | LSI data input |
| 10 | $\overline{\text{XSTB}}$ | O | LSI strobe output |
| 11 | $\overline{\text{XRST}}$ | O | LSI reset output |
| 12 | XA0 | O | LSI data discernment control signal output |
| 13 | VDCONT | O | VD power supply control output |
| 14 | EJKEY | I | Eject key input |
| 15 | $\overline{\text{ASENS}}$ | I | ACC power sense input |
| 16 | IPPOW | O | BUS driver power supply control output |
| 17 | LOADSW | I | Loading sense input |
| 18 | ELVSW | I | Elevation OK input |
| 19–21 | NC | | Not used |
| 22 | $\overline{\text{BSENS}}$ | I | Back up power sense input |
| 23 | SBSY | I | Signal indicating head of subcode block input |
| 24 | NC | | Not used |
| 25 | $\overline{\text{RESET}}$ | I | Reset input |
| 26 | POWER | O | +5V power supply control output |
| 27 | CONT | O | Servo driver power supply control output |
| 28 | XIN | I | Crystal oscillating element connection pin |
| 29 | XOUT | O | Crystal oscillating element connection pin |
| 30 | VSS | | GND |
| 31–33 | KST1-3 | O | Key strobe output |
| 34,35 | $\overline{\text{KD1}}$,$\overline{\text{KD2}}$ | I | Key data input |
| 36–38 | NC | | Not used |
| 39 | TESTIN | I | Test program mode input |
| 40 | DCLOSE | I | Door close sense input |
| 41 | WDSL | O | Data comparison designation output |
| 42 | XWIH | I | DRAM data white inhibit input |
| 43 | XEMP | I | DRAM data read inhibit input |
| 44 | CHDT | I | Data comparison mode monitor input |
| 45,46 | CHM0,1 | O | Data comparison mode output |

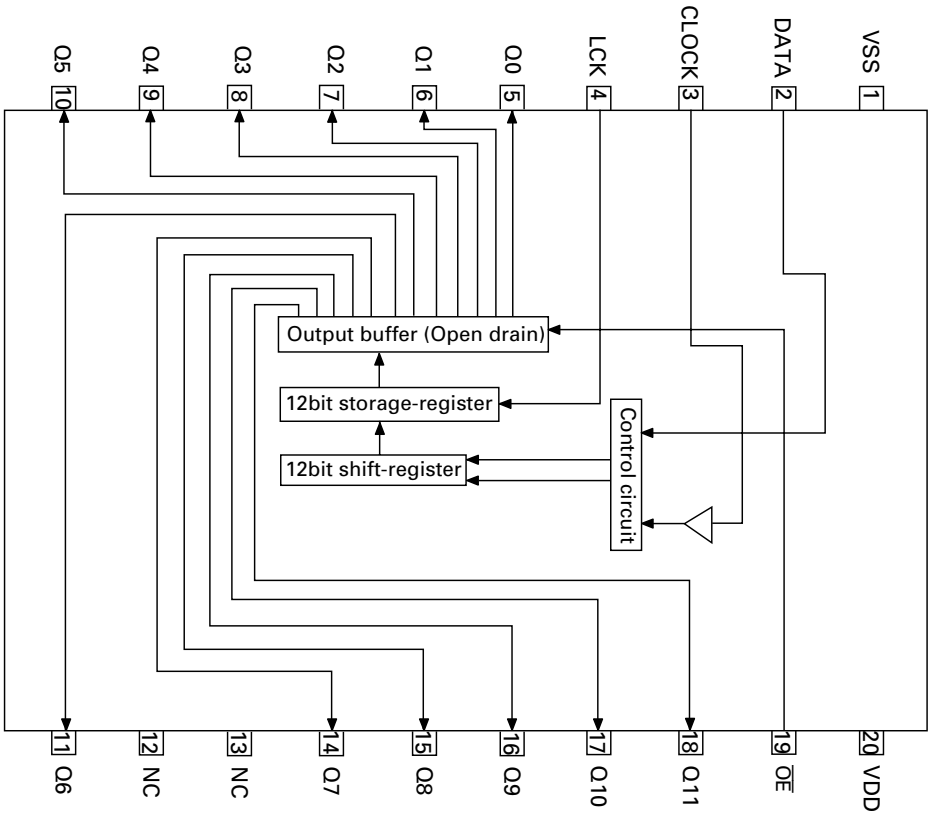
| Pin No. | Pin Name | I/O | Function and Operation |
|---|---|---|---|
| 47-49 | NC | | Not used |
| 50 | XWRE | O | DRAM data white enable output L:enable |
| 51 | XRDE | O | DRAM data read enable output L:enable |
| 52 | WQOK | O | SUB-Q OK output L:SUBQ OK |
| 53 | EMPH | O | DAC EMPH output |
| 54 | SCONT | O | Double speed select output |
| 55 | LOAD | O | PHOT power supply control output |
| 56 | CDMUTE | O | Mute output |
| 57,58 | LO2,LO1 | O | Load motor control output |
| 59,60 | ELV2,1 | O | ELV motor control output |
| 61,62 | CG2,1 | O | CAM motor control output |
| 63 | MIRR | I | Mirror detector input |
| 64 | LOCK | I | Spindle lock detector input |
| 65 | FOK | I | FOK signal input |
| 66 | EXSCK | O | Shift clock output |
| 67 | EXMODE | O | Latch clock output |
| 68 | EXSO | O | Serial data output |
| 69 | EXCE | O | Chip enable output |
| 70 | ILPOW | O | Illumination power supply control output |
| 71 | VCC | | Power supply terminal |
| 72 | VREF | I | A/D converter reference voltage input |
| 73 | AVSS | I | A/D converter GND |
| 74 | ADRMON | I | DRAM memory remaining monitor input |
| 75 | EREF | I | DRAM A/D converter reference voltage input |
| 76,77 | PH1,2 | I | Disc photo sense input |
| 78 | MAXSW | I | MAX switch input |
| 79 | ELVSNS | I | ELV position sense input |
| 80 | TEMP | I | Temperature detector input |

*PD5465A

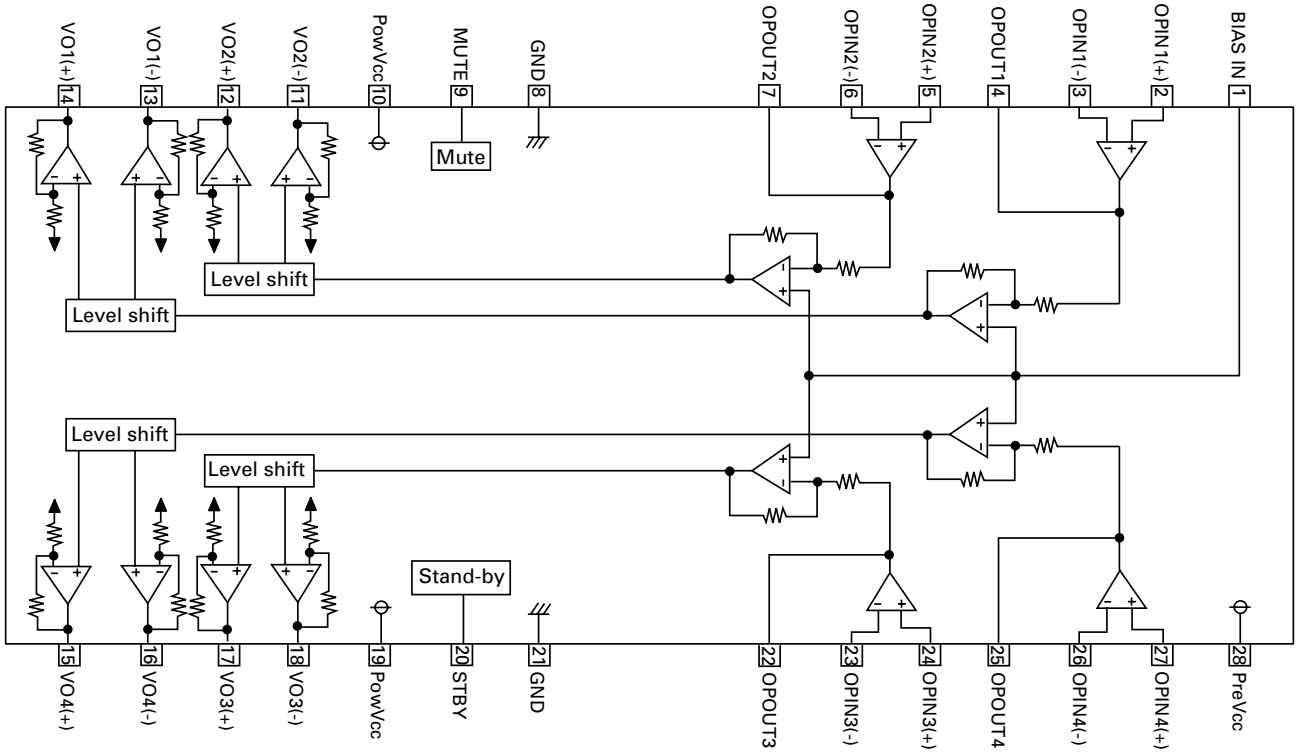



IC's marked by* are MOS type.
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

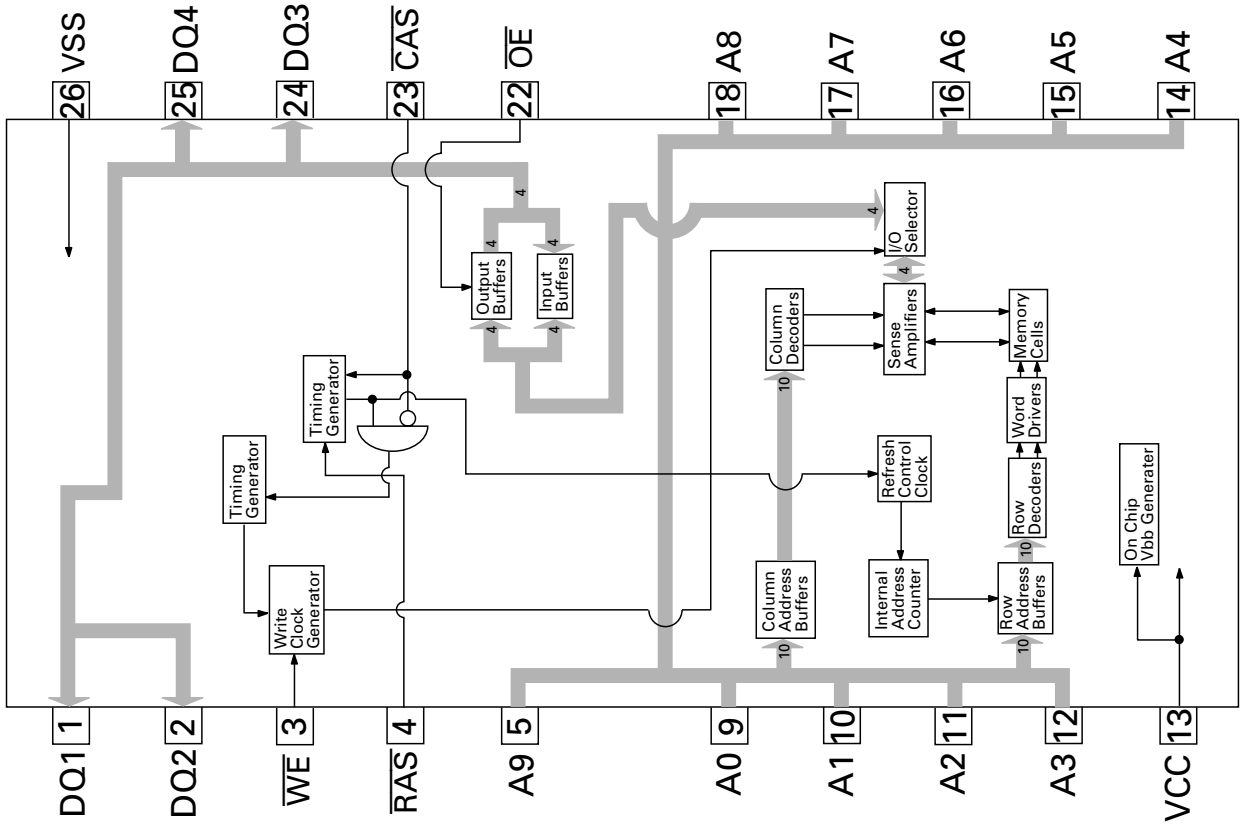
BU2092FV



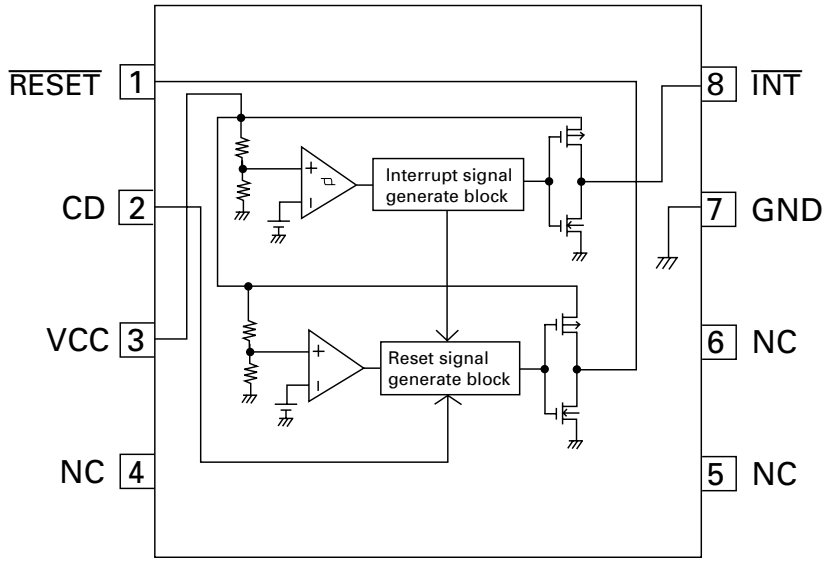

BA5986FM



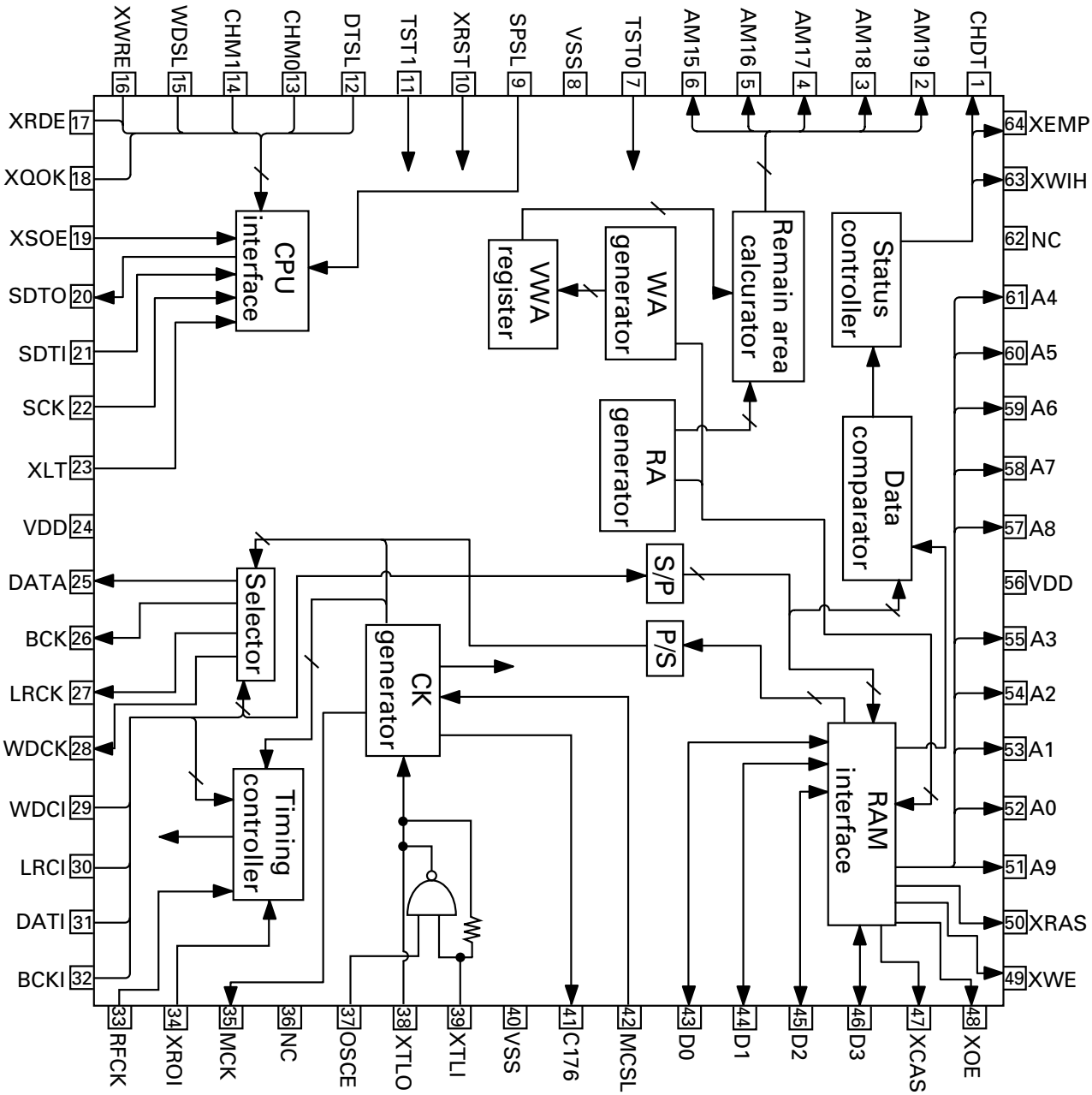
MSM514400DP-60TS




M62007FP



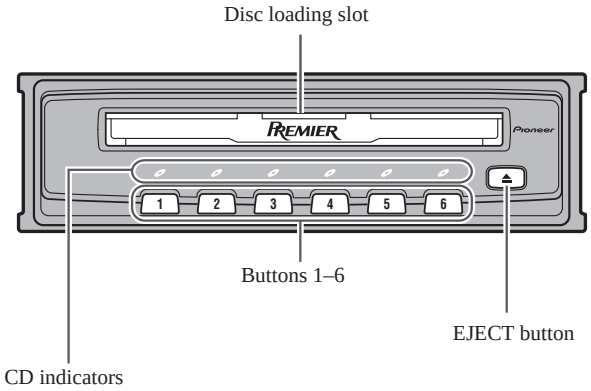
CXD2511R


XWRE 16
WDSL 15
CHM1 14
CHM0 13
DTSL 12
TST1 11
XRST 10
SPSL 9
VSS 8
TST0 7
AM15 6
AM16 5
AM17 4
AM18 3
AM19 2
CHDT 1
XRDE 17
XQOK 18
XSOE 19
SDTO 20
SDTI 21
SCK 22
XLT 23
VDD 24
DATA 25
BCK 26
LRCK 27
WDCK 28
WDCI 29
LRCI 30
DATI 31
BCKI 32
64 XEMP
63 XWIH
62 NC
61 A4
60 A5
59 A6
58 A7
57 A8
56 VDD
55 A3
54 A2
53 A1
52 A0
51 A9
50 XRAS
49 XWE
CPU interface
VWA register
WA generator
Remain area calcurator
Status controller
RA generator
Data comparator
S/P
P/S
Selector
CK generator
Timing controller
RAM interface
33 RFCK
34 XROI
35 MCK
36 NC
37 OSCE
38 XTLO
39 XTLI
40 VSS
41 C176
42 MCSL
43 D0
44 D1
45 D2
46 D3
47 XCAS
48 XOE

# 8. OPERATIONS AND SPECIFICATIONS

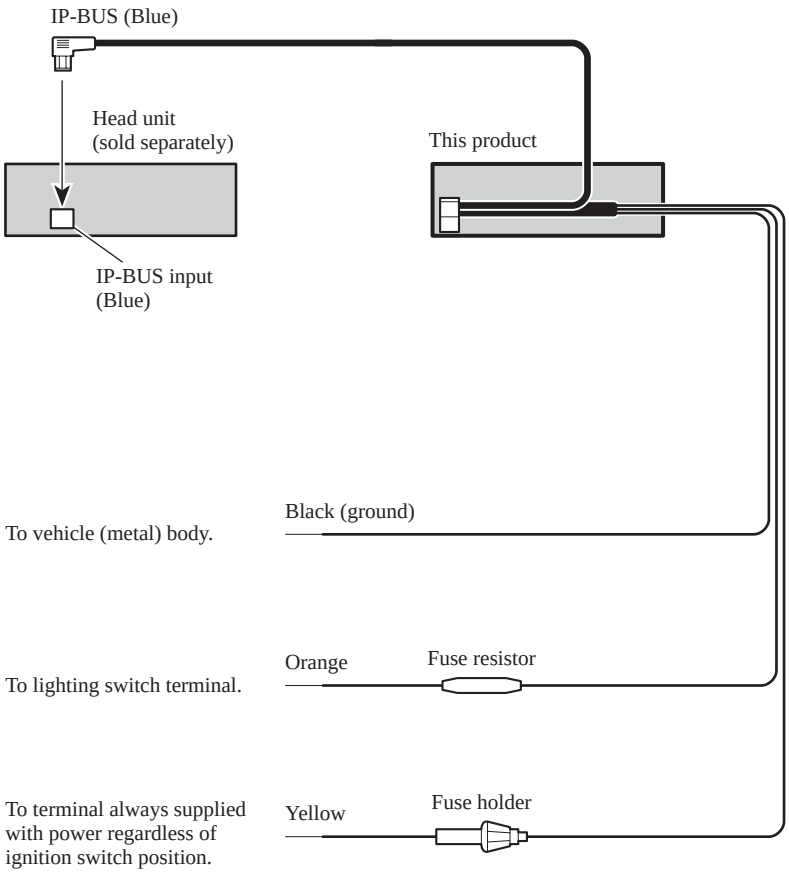
## 8.1 OPERATIONS

### *Key Finder*




| CD indicators | | Status |
|---|---|---|
| Green | Lit | A CD is loaded. |
| | Flashing | The unit is in the CD loading standby mode. |
| | | The unit is standing by during ejection of all the CDs. |
| Orange | Lit | The currently selected CD. |
| | Flashing | A CD is being loaded, changed or ejected. |
| Out | | No CD is loaded. |
| | | Power is switched OFF. |

## Connection Diagram




**Note:**
The electrical leads of this product may be different colors to the corresponding leads (i.e. the leads that serve the same function) of other products. When connecting this product to another product, please read the instruction manual for each product carefully and then connect each lead of this product to the other product that serves the same function.

# 8.2 SPECIFICATIONS

### General

Power source ..... 14.4 V DC (10.8 – 15.1 V allowable)
Grounding system ..... Negative type
Max. current consumption ..... 1.3 A
Dimensions
(mounting size) ..... 178 (W) × 50 (H) × 165 (D) mm
[7 (W) × 2 (H) × 6-1/2 (D) in.]
(nose) ..... 170 (W) × 46 (H) × 19 (D) mm
[6-3/4 (W) × 1-3/4 (H) × 3/4 (D) in.]
Weight ..... 1.5 kg (3.3 lbs.)

### CD player

System ..... Compact disc audio system
Usable discs ..... Compact disc
Signal format ..... Sampling frequency: 44.1 kHz
Number of quantizatin bits: 16; linear
Frequency characteristics ..... 20 – 20,000 Hz (±1 dB)
Signal-to-noise ratio ..... 92 dB (1 kHz) (IHF-A network)
Distortion ..... 0.006%
Dynamic range ..... 92 dB (1 kHz)
Output level ..... 1.0 V (1 kHz, 0 dB)
Number of channels ..... 2 (stereo)

**Note:**
- Specifications and the design are subject to possible modification without notice due to improvements.

# Service Manual

ORDER NO.
**CRT2376**

CD MECHANISM MODULE

# CX-890

**NOTE:**

- **This Service Manual outlines operations of the CD mechanism module used in the models listed blow.**
- **For repair, use this Service Manual and the Service Manual of the model used in the system.**

| Model | Service manual | CD mechanism module | CD mechanism unit |
|---|---|---|---|
| CDX-PD6/UC | CRT2372 | CXK4701 | CXB2700 |

## CONTENTS


1. MAIN PARTS LOCATIONS.....2
2. CIRCUIT DESCRIPTIONS.....3
3. MECHANISM OPERATIONS.....16
4. DISASSEMBLY.....21



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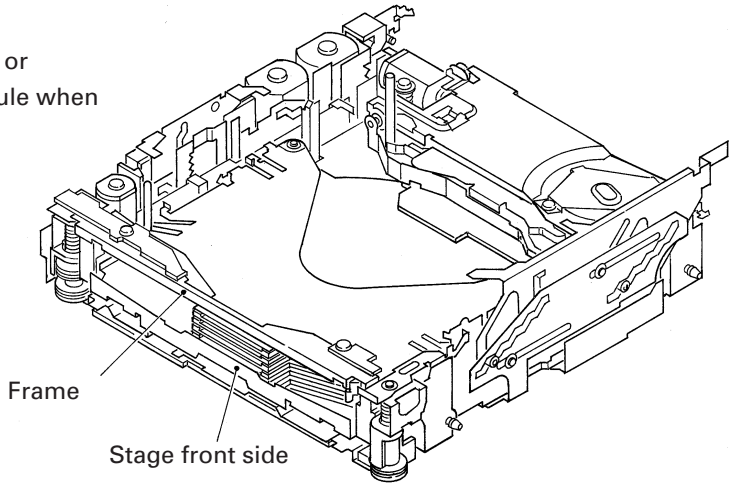
● **CD Player Service Precautions**

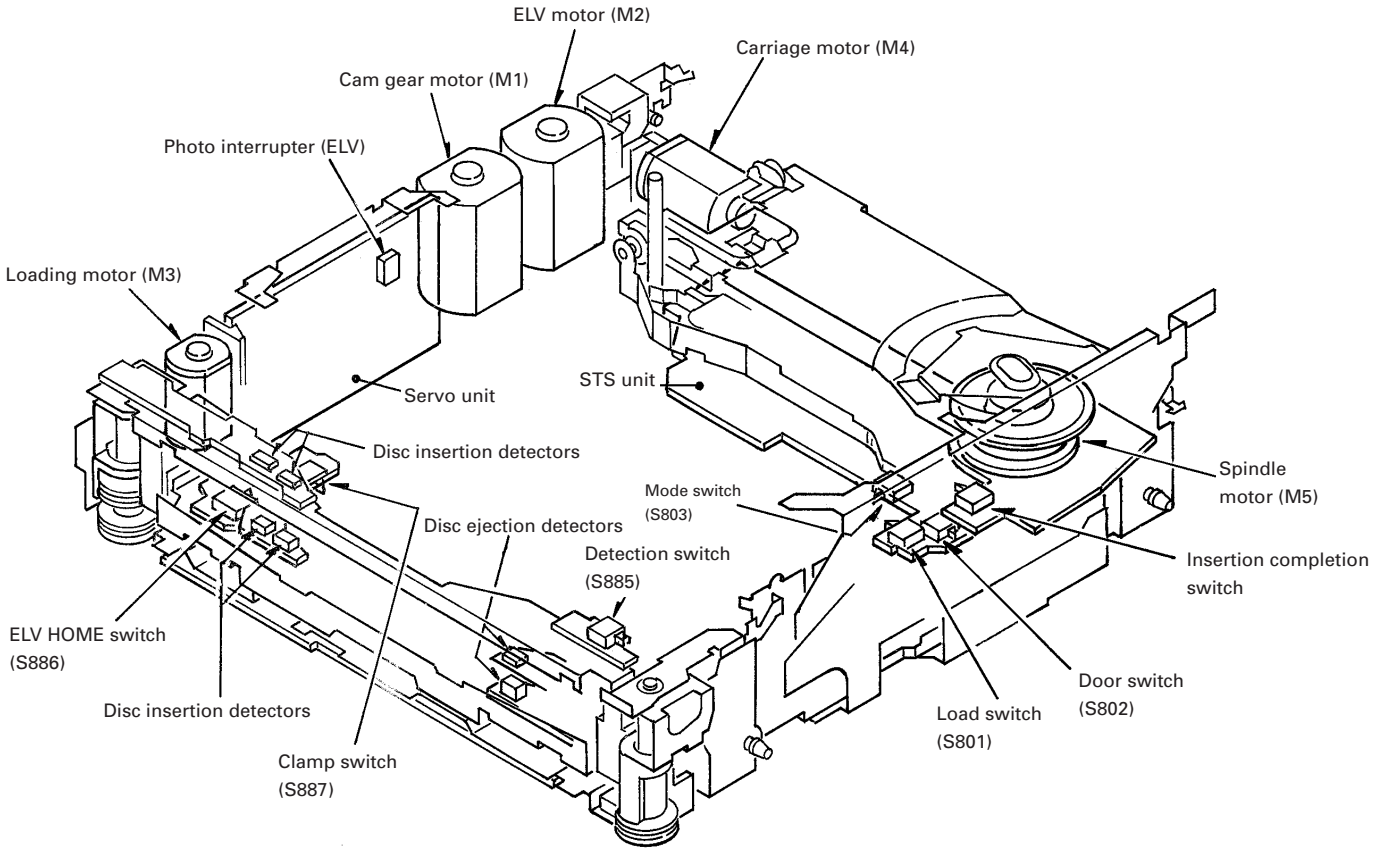
1. For pickup unit(CXX1311) handling, please refer to"Disassembly"(Page 21).
   During replacement, handling precautions shall be taken to prevent an electrostatic discharge(protection by a short pin).

Do not hold the upper frame of the disc insertion slot or the front side of the stage in the CD mechanism module when servicing to prevent them from being deformed.

2. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.




# 1. MAIN PARTS LOCATIONS



# 2. CIRCUIT DESCRIPTIONS

## 2.1 Preamplifier (UPC2572GS: IC101)

The preamplifier processes pickup output signals to generate signals to be sent to the servo, demodulator, and controller. The preamplifier with built-in photodetector converts signals from the pickup into intermediate voltage in the pickup. Then, addition is made in the RF amplifier (IC101) to obtain RF, FE, TE, and TE zero cross signals. The system consists of the UPC2572GS and other components explained below. The system uses a single power source (+5 V). Therefore, the reference voltage of IC101 and the reference voltage of the power unit and servo circuit are REFOUT (+2.5 V). REFOUT is obtained from REFOUT of servo LSI (IC201: UPD63702GF) via a buffer, and is output from Pin 19 of IC101. This REFOUT is used as reference for all measurements.

Note:Do NOT short-circuit REFOUT and GND during measurement.

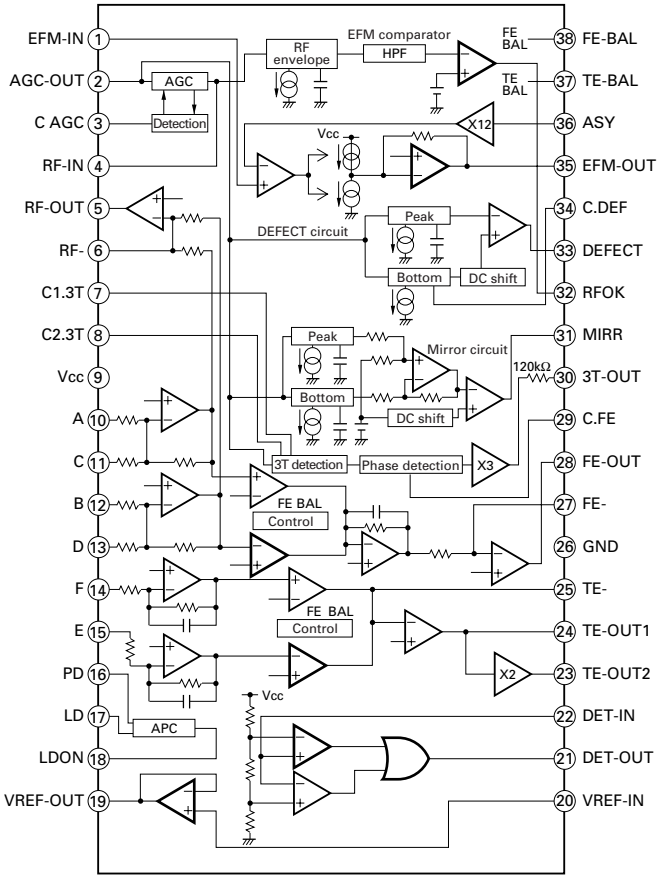



Fig. 1 Block Diagram of UPC2572GS

### 1) Automatic Power Control (APC) circuit

Laser diode has negative temperature characteristics with great optical output when the diode is driven with constant current. Therefore, current must be controlled by a monitor diode to ensure constant output. Thus functions the APC circuit. LD current can be obtained by measuring the voltage between LD1 and GND. The current value is approximately 35 mA.

$$\text{LD current(mA)} = \frac{\text{Voltage between LD1 and GND(mv)}}{10\ \Omega + 12\ \Omega}$$

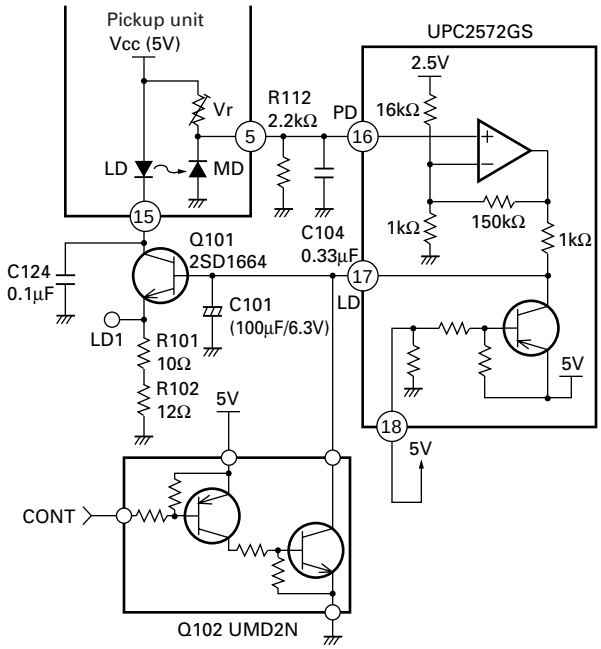



Fig. 2 APC Circuit

### 2) RF amplifier and RF AGC amplifier

Photodetector outputs (A+C) and (B+D) are added, amplified and equalized in IC101, and output to the RFI terminal as RF signal. (Eye pattern can be checked at this terminal.)

Low-frequency components of voltage RFI is:

$$RFI = ((A + C) + (B + D)) \times 3.22$$

where R111 is offset resistor to keep RFI signal within the output range of the preamplifier. RFI signal is goes under AC coupling, and is input to Pin 4 (RFIN terminal).

IC101 contains an RF AGC circuit. RFO output from Pin 2 is maintained to a constant level (1.2 ±0.2 Vp-p). The RFO signal is used in the EFM, DFCT, and MIRR circuits.

### 3) EFM circuit

The EFM circuit converts RF signal into digital signals of "0" and "1". RFO signal after AC coupling is input to Pin 1, and supplied to the EFM circuit.

Asymmetry caused during manufacturing of discs cannot be eliminated solely by AC coupling. Therefore, the system controls the reference voltage ASY of the EFM comparator by using the fact that probability to generate "0" and "1" is 50% in EFM signal. This reference voltage ASY is generated by output from the EFM comparator through L.P.F. EFM signal is output from Pin 35. As signal level, amplification is 2.5 Vp-p around REFOUT.

### 4) DFCT (defect) circuit

DFCT signal detects mirror defect in discs, and is output from Pin 33. The system outputs "H" when a mirror defect is detected.

If disc is soiled, the system determines it as lack of mirror. Therefore, the system inputs the DFCT signal output to the HOLD terminal of servo LSI. Focus and tracking servo drives change to Hold status only when DFCT output is in "H" so that performance of the system upon detection of defect can be improved.

### 5) RFOK circuit

The RFOK circuit outputs signal to show the timing of focus closing servo, as well as the status of focus closing during playback. The signal is output from Pin 32. The system inputs the RFOK signal output to the RFOK terminal of servo LSI. The servo LSI issues Focus Close command. The system outputs signal in "H" during focus closing and playback.

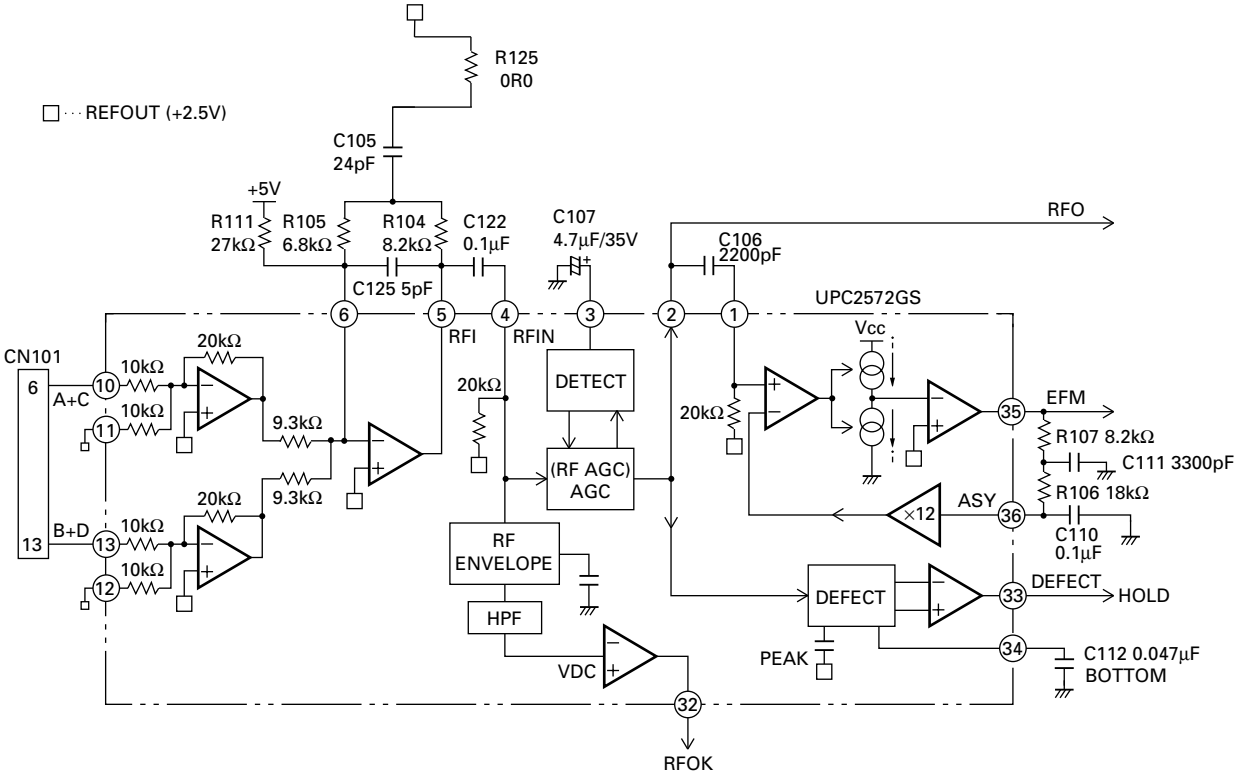



Fig. 3 RF AMP, RF AGC, EFM, DFCT, RFOK Circuit

### 6) Focus-error amplifier

The system outputs photodetector output (A+C) and (B+D) as FE signal (A+C)-(B+D) from Pin 28 via the difference amplifier, then via the error amplifier.

Low-frequency components of voltage FEY is:

$$FEY=(A+C)-(B+D)\times\frac{20k\Omega}{10k\Omega}\times\frac{90k\Omega}{68.8k\Omega}\times\frac{R108}{17.2k\Omega}$$

: (FE level of pickup unit x 5.02)

An S curve equivalent to approximately 1.6 Vp-p is obtained at FE output (Pin 28) by using REFO as reference. The cut-off frequency of the amplifier of the last layer is 12.4 kHz.

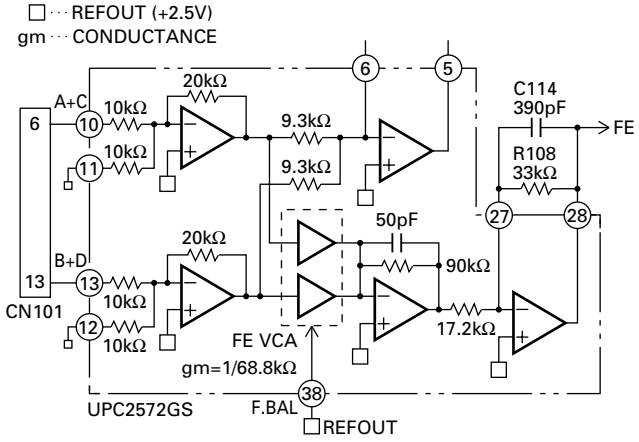



Fig. 4 Focus-error amplifier

### 7) Tracking-error amplifier

Outputs E and F from the photodetector are output as TE signal (E-F) from Pin 24 via the difference amplifier, then via the error amplifier.

Low-frequency components of voltage TEY is:

$$TEY=(E-F)\times\frac{63k\Omega}{(31k\Omega+16k\Omega)}\times\frac{68k\Omega}{17k\Omega}$$

: (TE level of pickup unit x 5.36)

TE waveforms equivalent to approximately 1.5 Vp-p are obtained at TE output (Pin 24) by using REFO as reference. The cut-off frequency of the amplifier of the last layer is 19.5 kHz.

### 8) Tracking zero-cross amplifier

Tracking zero-cross signal (TEC signal) is generated by amplifying TE waveforms (voltage at Pin 24) by a factor of four. The signal is used for detecting the zero-cross point of tracking error in the servo LSI UPD63702AGF. The purposes of detecting the zero-cross point are as follows:

(1)To be used for counting tracks for carriage move and track jump.

(2)To be used for detecting the direction of lens movement when tracking is closed. (To be used in the tracking brake circuit mentioned later.)

The frequency range of TEC signal is from 500 Hz to 19.5 kHz.

Voltage TEC = TE level x 4

In other words, the TEC signal level is calculated as 6 Vp-p. This level exceeds the D range of the operation amplifier, resulting in the signal to clip. However, there shall be no problem, since the servo LSI uses only zero-cross point.

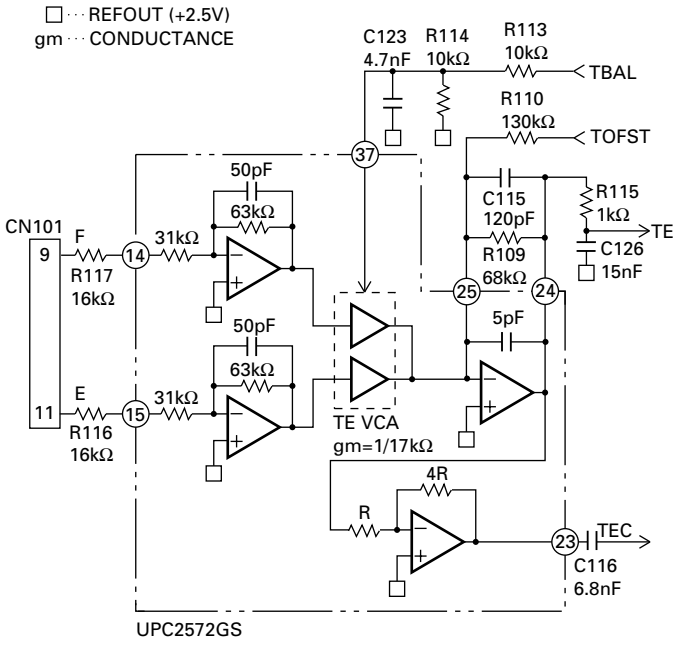



Fig. 5 Tracking-error amplifier, Tracking zero-cross amplifier

### 9) MIRR (mirror) circuit

MIRR signal shows ON and OFF track information. The signal is output from Pin 31.

The status of MIRR signal is as follows:

Laser beam ON track: MIRR = "L"

Laser beam OFF track: MIRR = "H"

The signal is used in the brake circuit mentioned later.

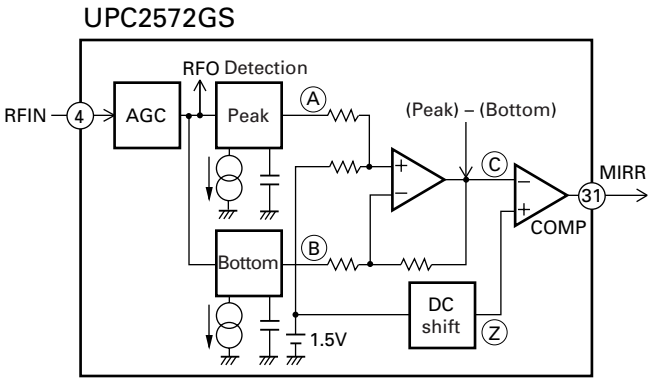



Fig.6 MIRR Circuit

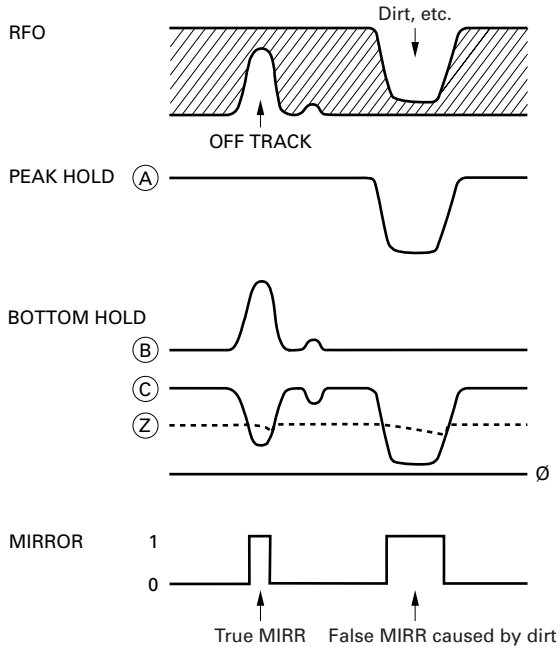



Fig. 7 MIRR Circuit

### 10) 3T OUT circuit

The system detects flickering of RF signal when disturbance is input to the focus servo loop, and outputs the difference of phase between FE signal and RF-level fluctuation signal from Pin 30. The resulting signal is obtained through L.P.F. with a fc of 40 Hz. This signal is used for automatic adjustment of FE bias.

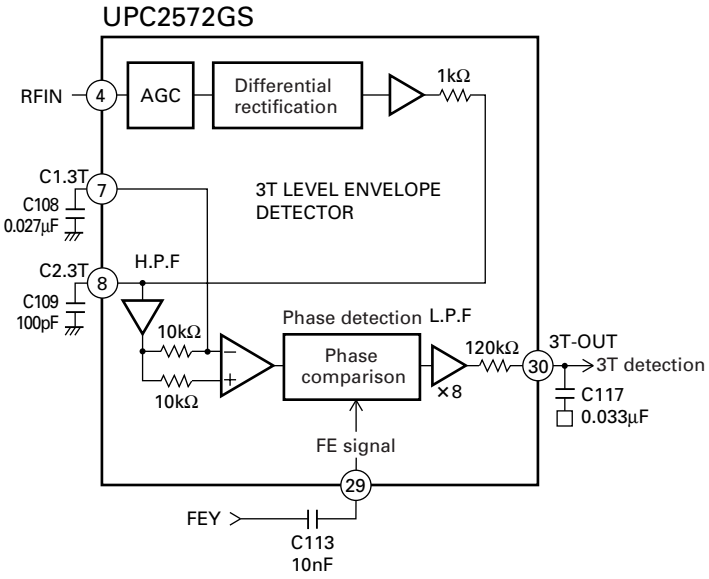



Fig. 8 3T OUT Circuit

## 2.2 Servo (UPD63702AGF: IC201)

The servo consists of mainly two parts. The first part is the servo processing unit to equalize error signals and control track jump, carriage move, in focus, etc. The second part is the signal processing unit to perform data decoding, error correction, and interpolation.
The system converts FE and TE signals from analog to digital in IC201, then outputs drive signals of the focus, tracking, and carriage systems via the servo block. The EFM signal input from the preamplifier is decoded by the signal processing unit, and eventually output as audio signal after conversion into analog from digital signals via the DA converter (IC201 contains audio DAC). Then, the system generates error signal for the spindle servo in the decoding process, sends the signal to the spindle servo to generate drive signal for spindle.
After that, drive signals for focus, tracking, carriage, and spindle are amplified in IC301 and BA5986FM, and supplied to respective actuators and motors.

### 1) Focus servo system

The main equalizer of focus servo is located in the UPD63702AGF. Fig. 9 shows block diagram of the focus servo.
For the focus servo system, the lens must be positioned within the focusing range in order to perform focus closing. To achieve this, the system moves the lens upward/downward by focus-search voltage of triangular waveform to detect the focusing point. During searching, the system kicks the SPDL motor to maintain rotation speed to set speed.
The servo LSI monitors FE and RFOK signals so that focus closing is performed automatically at an appropriate point.
Focus closing is performed when the following four conditions are satisfied:
(1)When the lens moves nearer to the disc.
(2)RFOK = "H"
(3)FZD signal (in IC) is latched to "H"
(4)FE = 0 (REFOUT as reference)

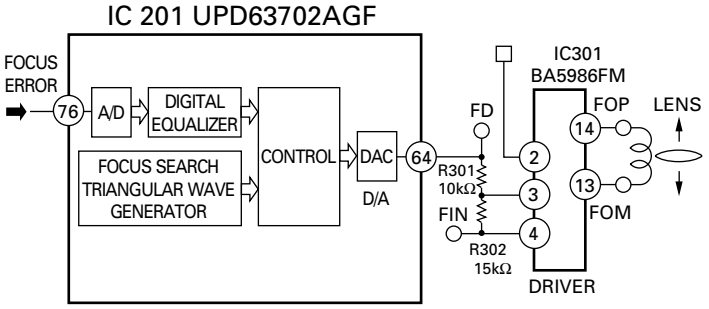



Fig. 9 Focus servo block diagram

When the conditions mentioned above are satisfied and focus is closed, the XSO terminal changes from "H" to "L". Then, the microcomputer starts monitoring RFOK signal through L.P.F after 40 ms.
If the system judges RFOK signal as "L", the microcomputer takes actions, including protection.
Fig. 10 shows operations related to focus closing. (The illustration shows when the system cannot perform focus closing.) S curve, search voltage, and actual lens behavior can be checked by pressing the Focus Close button when "01" is shown in Focus Mode Select in Test mode.

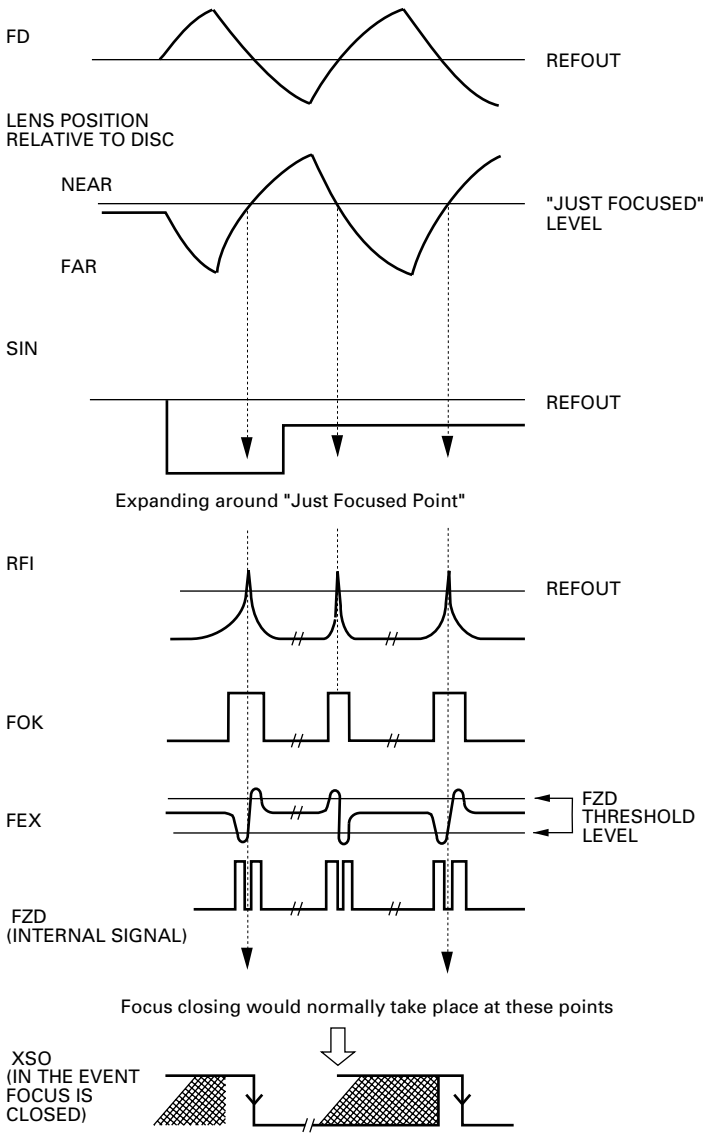



Fig. 10 Sequence of Focus Closing

### 2) Tracking servo system

The main equalizer of tracking servo is located in the UPD63702AGF. Fig. 11 shows block diagram of the tracking servo.

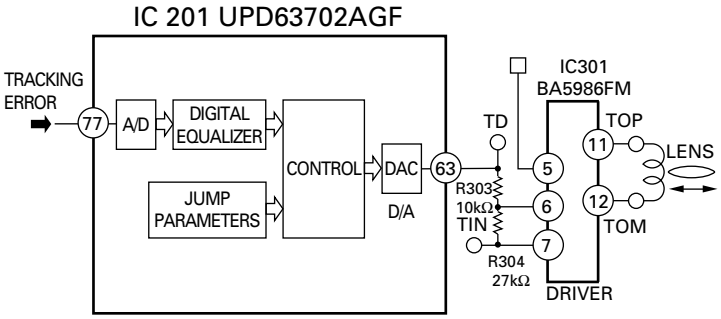



Fig. 11 Tracking servo block diagram

a) Track jump

Track jump is automatically performed by the auto sequence function in LSI when the LSI accepts command. The system has six types of jump (1, 4, 10, 32, 32x2, and 32x3) for truck jump during searching. In Test mode, the system can select and check these jump types and CRG move by selecting a mode. The microcomputer sets half of the total number of track jumps (two tracks if the total number of tracks are four), and counts the set number of tracks by using TEC signal.

The system outputs brake pulse for a specified time (set by the microcomputer) from the point of time when the set number is counted, and stops the lens. Thus, tracking is closed, and the system can continue normal playback.

To improve servo withdrawal during track jump, the system sets the brake circuit to ON for 60 ms after brake pulse so that gain of the tracking servo can be increased.

FF/REV in normal mode is made by continuously performing single jump approximately ten times faster than in normal playback.

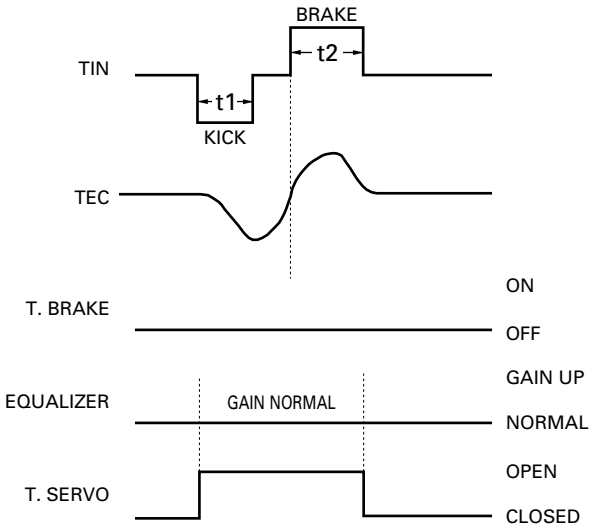



Fig. 12 Single track jump

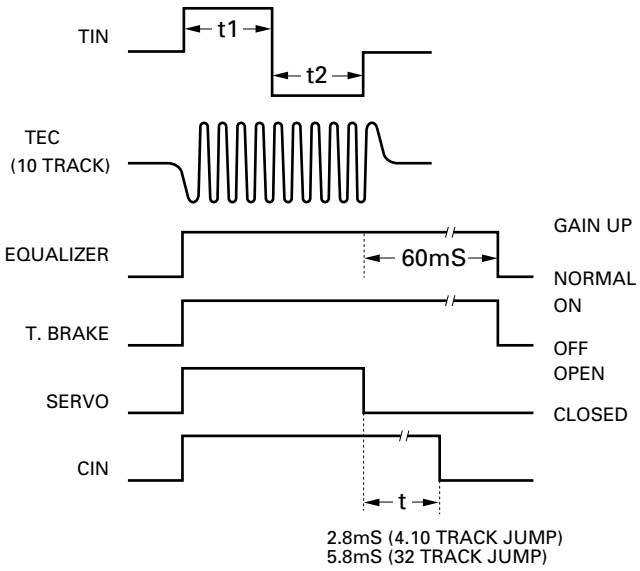
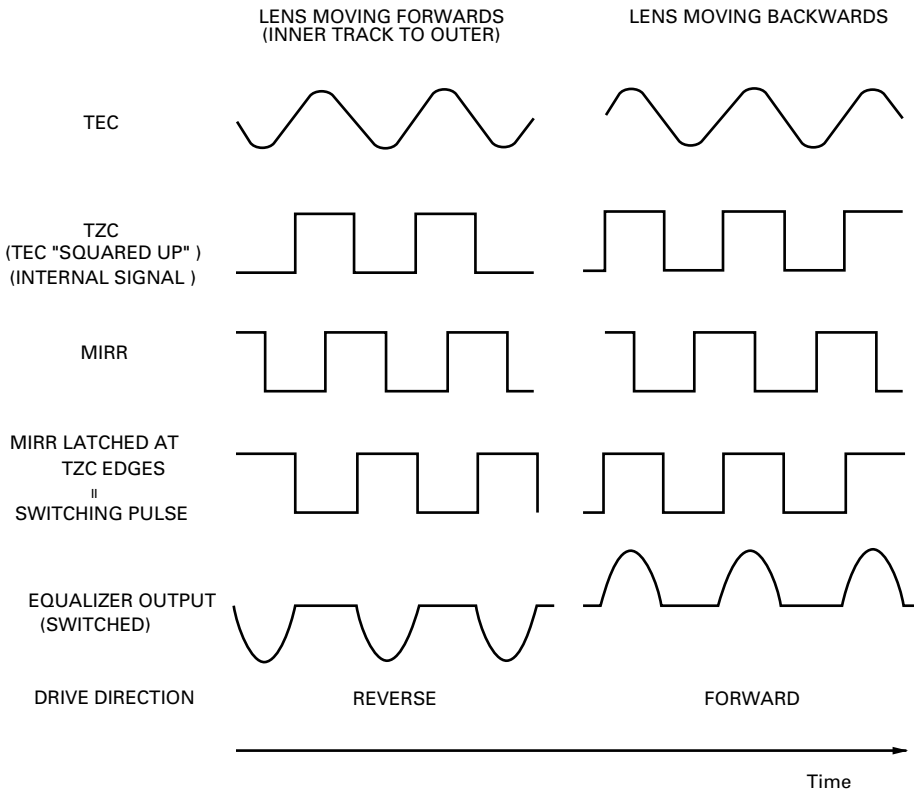



Fig. 13 Multi track jump

b) Brake circuit
Servo withdrawal will deteriorate during setting and track jump. Thus, the system uses the brake circuit to provide stable withdrawal to servo loop.
The brake circuit detects the direction of lens movement, and outputs only drive signal in the opposite direction from the lens movement. Thus, the system delays the speed of the lens movement to stabilize withdrawal of the tracking servo.
The system judges sliding direction of track from TEC and MIRR signals, as well as the relationship of their phase.




Note: In the illustration, the phase of equalizer output is shown as the same as with that of TEC.

Fig. 14 Tracking Brake Circuit

### 3) Carriage servo system

Output from low-frequency components (lens position information) of the tracking equalizer is input to the carriage equalizer by the carriage servo. After obtaining a certain gain, the system outputs drive signal from the servo LSI. The signal is then applied to the carriage motor via the driver IC. More specifically, the pickup unit as a whole must be moved forward when lens offset during playback reaches a specified level. Therefore, gain of equalizer is set so that voltage higher than the activation voltage of the carriage motor is output. As actual operation, a certain threshold level is set for equalizer output in the servo LSI, and drive voltage is output from the servo LSI only when the equalizer output level exceeds that level. Thus, power consumption is reduced. Depending on eccentricity, etc. of disc, the equalizer output voltage may cross the threshold level several times before the pickup unit as a whole starts operation. At this time, waveforms of drive voltage from LSI are output as pulse.

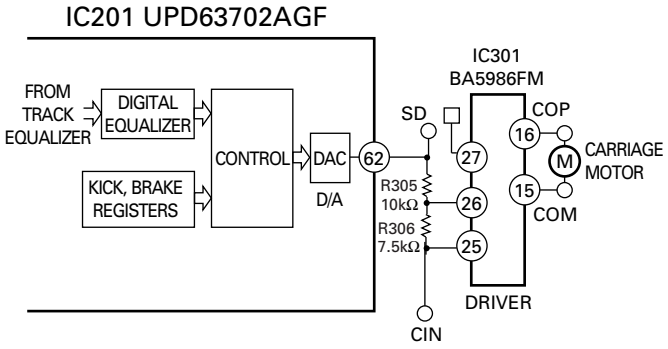



Fig. 15 Carriage Servo Circuit

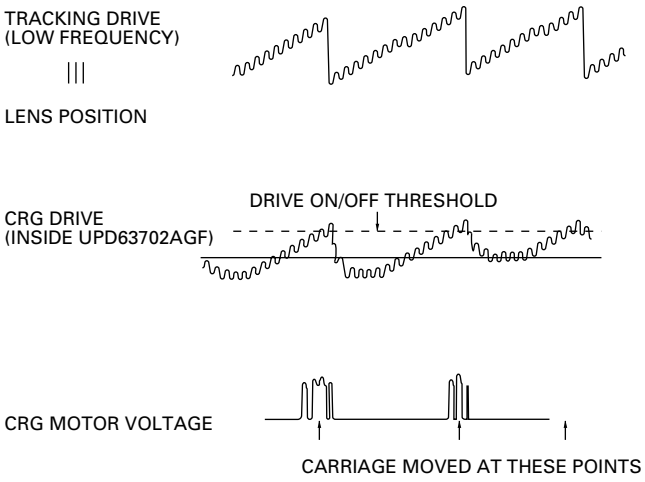



Fig. 16 Carriage Signal Waveforms

**4) Spindle servo system**

The spindle servo has the following modes:

(1)Kick mode:To be used for accelerating disc rotation during setting.

(2)Offset mode:

a)To be used after completion of kick until comple tion of spindle lock during setting.

b)If focus is out of range during playback, this mode is used until focus is recovered. In both cases, Offset mode is used for maintaining disc rotation to the speed close to specified rotation.

(3)Adaptive Servo mode: CLV servo mode during normal operation. The system samples every WFCK in 16 cycles whether frame synchronous signal matches output from the internal frame counter in EFM demodulation block, and generates signal that shows matching/unmatching status. If signal showing unmatching status continues for 8 times, the system deems it as asynchronous status. Except this case, the system judges as synchronous. In Adaptive Servo mode, the system automatically selects withdrawal servo for asynchronous status, and steady-state servo for synchronous status.

(4)Brake mode: Mode to stop the spindle motor. The microcomputer outputs brake voltage from the servo LSI. Waveforms of EFM are monitored inside the LSI. If the longest pattern of EFM exceeds specified intervals (if the rotation speed adequately slowed down), flag is activated in the LSI, and the microcomputer turns brake voltage to OFF. If no flag is activated after a specified time, the microcomputer changes from Brake to Stop mode. This status continues for a specified time. If the system changes to Stop mode during ejection, disc is ejected after the specified time mentioned above.

(5)Stop mode: To be used when the power is turned to ON, and during ejection. In Stop mode, the end-to-end voltage of the spindle motor is 0 V.

(6)Rough Servo mode: To be used when returning carriage (carriage move during long search, etc.). The system calculates linear speed from waveforms of EFM, and inputs either "H" or "L" level to the spindle equalizer. This mode is also used for confirmation of grating in Test mode.

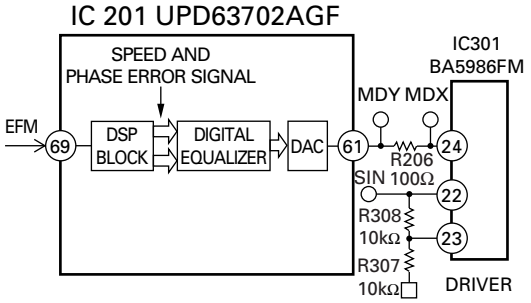



Fig. 17 Spindle servo block diagram

## 2.3 Automatic Adjustment Function

With this system, all circuit adjustments are automatically performed by using the preamplifier (UPC2572GS) and servo LSI (UPD63702AGF). All adjustments are automatically performed whenever disc is inserted or CD mode is selected by the Source key. Details of automatic adjustments are as follows:

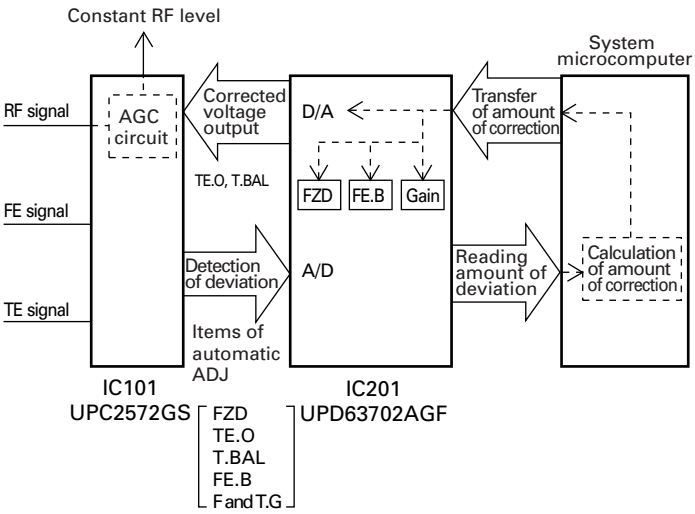



Fig. 18 Outline of Automatic Adjustment

**1) Setting of FZD cancellation**

This setting ensures focus closing. The system reads the FE offset level when the power is turned to ON, then writes the inverse voltage of offset value of that level to CRAM inside IC to cancel offset. Thus, the threshold level of FZD can be set to a constant value (+150 mV). As a result, "Latching FZD signal to H", which is one of the conditions required for focus closing in IC, is ensured.

**2) TE offset automatic adjustment**

Adjusts TE amplifier offset of the preamplifier to 0 V when the power is turned to ON.

Adjustment is made as follows:

(1)The microcomputer reads TE offset in LD OFF status via the servo LSI (TE1).

(2)The microcomputer calculates the voltage to be corrected using the TE1 value, and outputs from Pin 65 (pin name: TOFST) of the servo LSI. More specifically, calculation is made as follows:

TOFST2 = TOFST1 + TE1 x R110 / R109

**3) Tracking balance (T.BAL) automatic adjustment**

To make the sensitivity of Ech of TE output equal to that of Fch. In fact, adjustment is made so that the upper and lower portions of TE waveforms are symmetric to REFOUT.

Adjustment is made in the following steps:

(1)After focus close, the system kicks the lens in the radial direction to ensure TE waveforms to be generated.

(2)The microcomputer reads the peak bottom of TE waveforms via the servo LSI.

(3)The microcomputer calculates the amount of offset, then calculates the voltage to be corrected based on that offset. The system outputs the result from Pin 66 (pin name: TBAL) of the servo LSI.

(4)The voltage output from the servo LSI is input to Pin 37 of the preamplifier (IC101: UPC2572GS). Pin 37 is a control-voltage terminal of the TEVCA amplifier. According to voltage input, the system changes gain of Ech and Fch in the preamplifier, and adjusts the tracking balance to make the upper and lower portions of TE waveforms symmetric to REFOUT.

**4) FE bias automatic adjustment**

Maximizes the RFI level by optimizing focus point during playback. Adjustment is made by using 3T level waveforms of RF waveforms and the phase difference generated by input of disturbance of focus error. Since adjustment is made by inputting disturbance to focus loop, the system uses the same timing as with auto gain control (mentioned later~) for adjustment.

Adjustment is made in the following steps:

(1)Disturbance is input to focus loop by the command from the microcomputer (inside the servo LSI).

(2)The system detects flickering of 3T components of RF signal in the preamplifier.

(3)The system checks the phase difference between 3T components mentioned above and FE signal caused by input of disturbance to detect the direction of focus deviation. The result is output as DC voltage from Pin 30 (3TOUT) of the preamplifier.

(4)The 3TOUT voltage is input to Pin 75 (A/D port) of the servo LSI. The microcomputer reads this 3TOUT voltage via the servo LSI.

(5)The microcomputer calculates the amount of correction required. The results are transferred to offset of focus loop in the servo LSI.

As with auto gain control, the system repeats the same adjustment process several times to improve adjustment precision.

**5) Auto gain control (AGC)**

AGC adjustment is already used in the CD modules of the previous generation. This function automatically adjusts servo loop gain of focus and tracking.
Adjustment is made in the following steps:

(1)Disturbance is input to servo loop.

(2)The system extracts error signals (FE and TE) upon input of disturbance via the B.P.F. and obtains signals of G1 and G2.

(3)The microcomputer reads G1 and G2 signals via the servo LSI.

(4)The microcomputer calculates required amount of correction to adjust loop gain in the servo LSI. The system repeats the same adjustment process several times to improve adjustment precision.

**6) Initial adjustment value**

For all automatic adjustments, the system uses the previous adjustment value as initial values, except when the power of the microcomputer has been turned to OFF (backup is turned to OFF). If backup has been turned to OFF, the system uses initial set value to perform automatic adjustment.

**7) Display of coefficients of adjustment results**

Results of automatic adjustments can be displayed in Test mode for confirmation. Display of coefficients in each automatic adjustment is as follows:

(1)FZD cancel, TE.OFST cancel, T.BAL, and FE bias
Reference = 32 (32: No adjustment was required)
Display is made in units of approximately 40 mV.
Example: Coefficient of FZD cancel = 35
35 - 32 = 3 3 x 40 mV = 120 mV
Corrected amount is approximately +120 mV.
Thus, FE offset before adjustment is -120 mV.

(2)Adjustment of F and T gain
Reference: Focus = 13, tracking = 20
The amount of reduced gain in comparison with the reference is known by looking at the coefficient dis played.
Example: AGC coefficient = 40
Amount of reduced gain = 20 log (20/40) = -6dB

## 2.4 Power Supply and Mechanism Control

The power supply VM (7.5V) is produced from the power supply VD (9.0V) supplied from the extension P.C. board, and used as the power supply for the loading motor driver, elevation motor driver, cam gear motor driver, and 5V Reg IC. As for the drive voltage for the disc detection LEDs and the power supply for the CD driver ICs, the power supply VD (9.0V) is used. The system IC controls the ON/OFF operations of the CD driver and laser diodes,the 5V power supply, and the drive voltage PVD for detection LEDs with "CONT", "POWER", and "LOAD" signals respectively.

## 2.5 STS(Sure Track System) Circuit

By pooling the musical data read in from a compact disc into the memory, even if the pickup should go off track for some reason, the Sure Track System enables prevention of sound interruption during recovery (approximately 3 seconds) by continuing to output data from the memory.

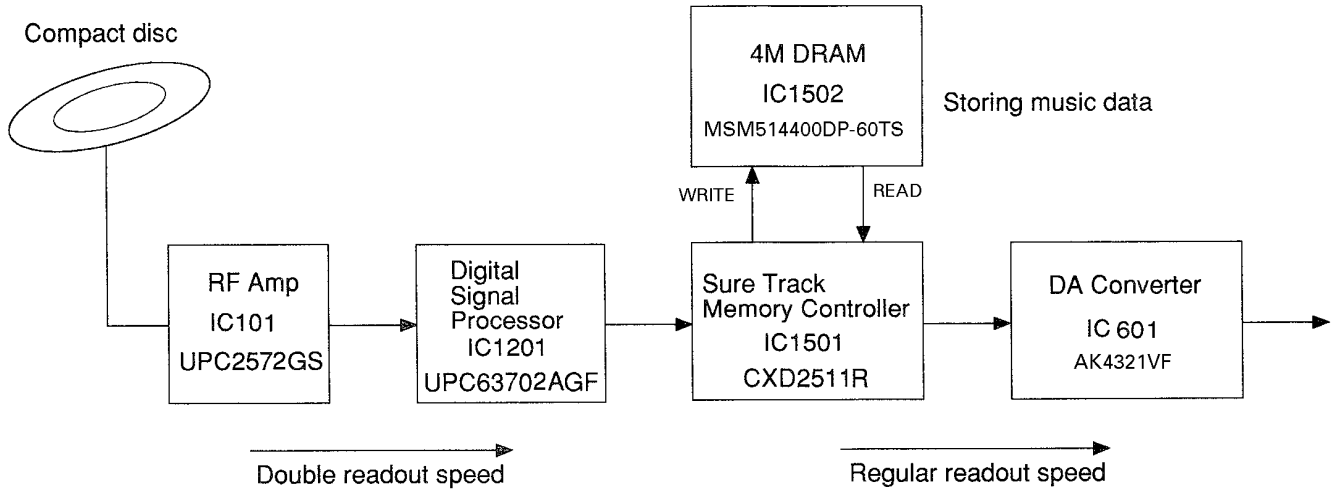



Fig. 19

Operation Principle

The STS circuit is controlled by the vibration free memory controller (CXD2511R). Data read in at double speed from a compact disc is input via the digital signal processing circuit into CXD2511R.

CXD2511R stores this DA data in DRAM (MSM5114400 DP-60TS), and reads and outputs the data at normal speed in synchronization with the internally generated FS system clock. In order to write the DA data at double speed and to read out at normal speed, the DRAM becomes full, but when it reaches capacity it will tentatively stop reading data. (The CD is in the pause mode during this time.) When an available area is created by data read-out from the DRAM, data writing will start again. (The available area of the DRAM can be monitored by ADRMON. By repeating this process, the DRAM is always used effectively, and approximately 2.67 seconds worth data can be stored. Even if the pickup should go off track due to vibrations for example, if recovered within 2.67 seconds while using the memorized data, sound interruption can be prevented.

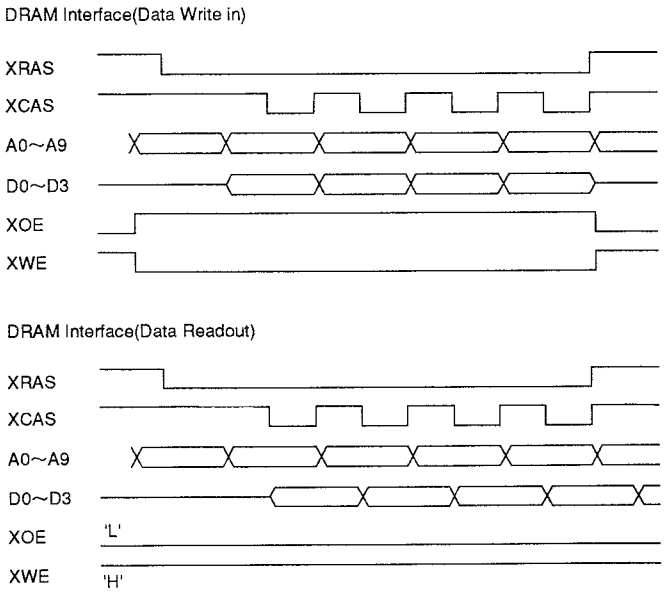



Fig. 20 TIMING CHART

# 3. MECHANISM OPERATIONS

## 3.1 Disc Insertion

a)The Cam gear rotates to the elevation OK position (See "How to remove the Tray Assy" on page 21). The Stage Mech Assy moves upwards or downwards to reach the height of the selected tray by using the elevation mechanism.

b)The Cam gear rotates counterclockwise until the LOAD switch is turned off. The Beak arms of the Stage Mech ASSY driven by the Cam gear's movement lift the selected tray.

c)The Stage Mech Assy with the tray lifted moves to the top position using the elevation mechanism.

* Disc insertion/ejection is performed at the top position (the 6th stage) irrespectively of tray position.

d)The Cam gear rotates counterclockwise to move the LOAD arms as shown in Fig.21.

e)The LOAD arms push the disc loaded on the tray and open the tray hooks.

f)When a disc is inserted, the disc interrupts the infrared LED light from the photo transistors, and the Rubber roller starts rotating.

* The photo transistors are connected in serial. When the light is interrupted from either photo-transistor, the start of disc insertion will be detected.

g)The disc is drawn in. Then the disc pushes the insertion completion switch via the arm.

h)The LOAD arms move forward to be released from the disc. At the same time, the tray hooks close to hold the disc on the tray.

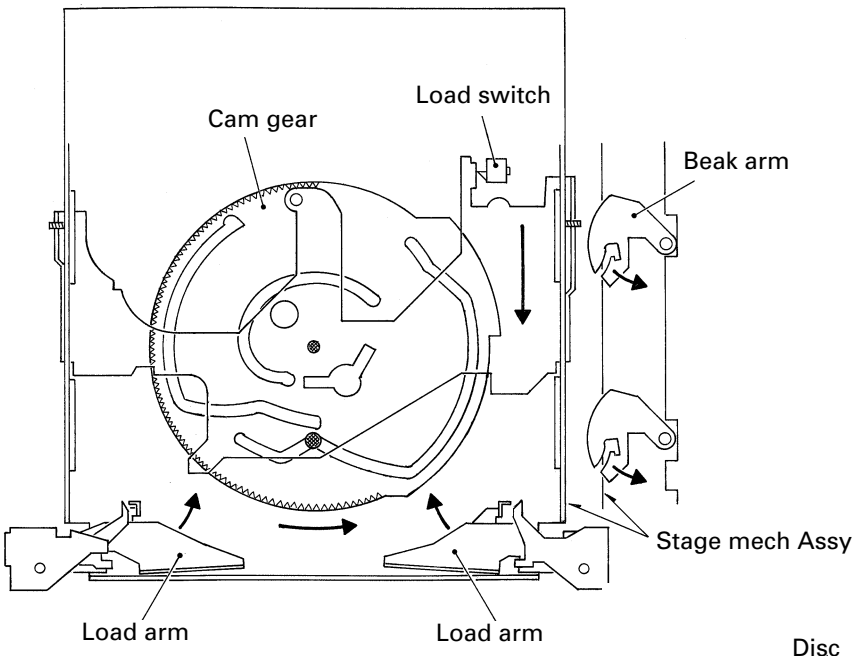



Fig. 21: Elevation OK position

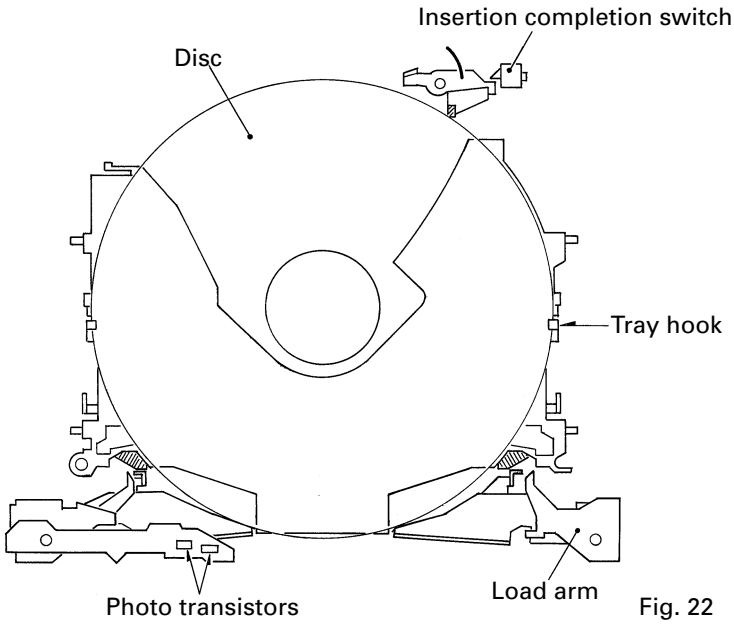



Fig. 22

## 3.2 Elevation

a)The Cam gear rotates to the elevation OK position.
b)The ELV motor rotates to slide the elevation lever via the gears.
c)The 2 elevation levers (left and right) can synchronize their sliding via the joint arm.
d)The shafts of the Stage Mech Assy engage with the stair-like grooves in the elevation levers and the vertical holes in the Main chassis via the rollers.
e) When the elevation levers slide, the Stage Mech Assy moves up and down.

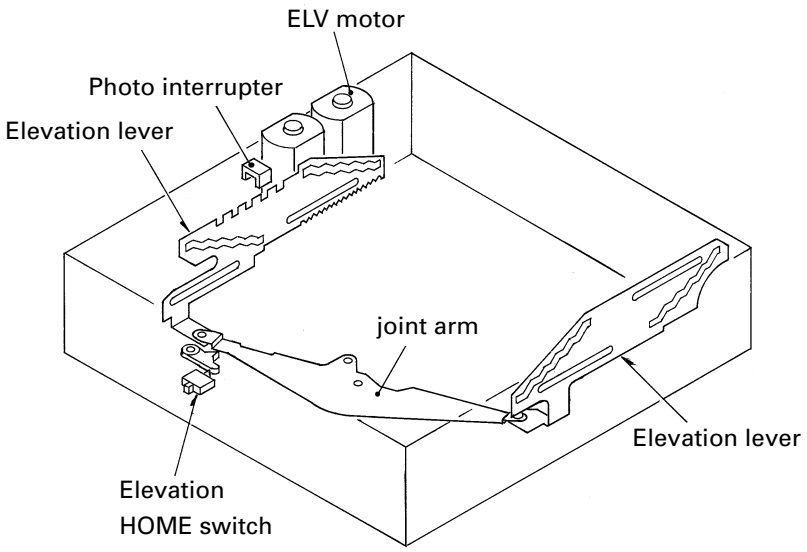



Fig. 23

## 3.3 Elevation Detection

a)The elevation detection (slit count) is performed by the photo interrupter.
b)After the elevation HOME switch is turned ON, the photo interrupter counts the slits of the elevation levers.
* The bottom position (the 1st stage) is detected when the elevation HOME switch is turned on (not detected by the photo interrupter).

## 3.4 Disc Clamp

a)The Stage Mech Assy moves up and down to reach the height of the selected tray, using the elevation mechanism.

b)The Cam gear rotates clockwise, the Carriage drive arm rotates, and then the Carriage Mech Assy moves toward the disc via the Carriage drive shaft.

c)The Cam gear continues rotating clockwise and the Carriage drive shaft moves the Clamp UP lever. Then the Clamp arm touching the Clamp UP roller moves down to clamp the disc.

d)The Cam gear stops when the Clamp switch is turned ON.

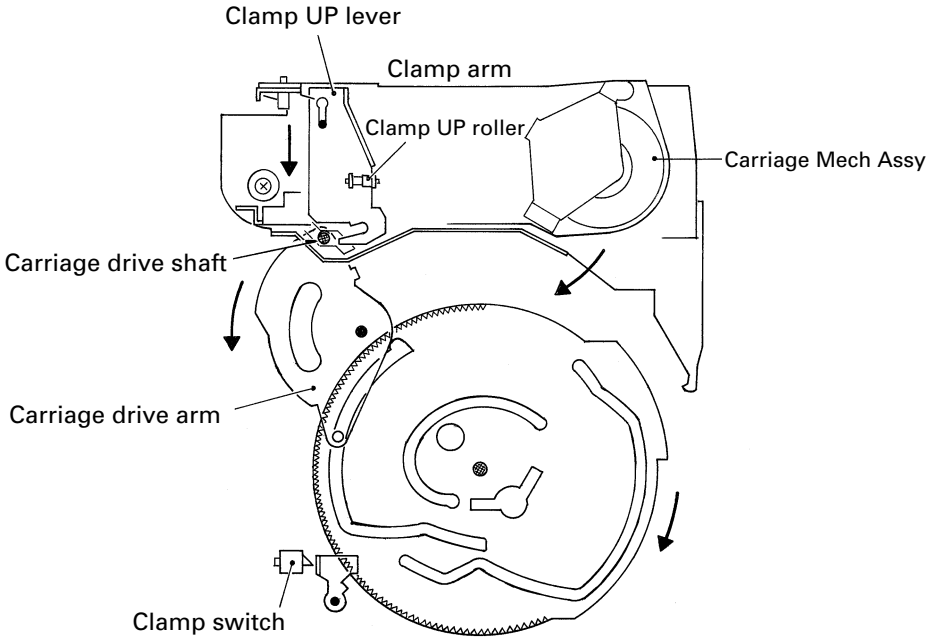



Fig. 24

## 3.5 Disc Sense (Initializing)

a)The disc sense operation is to detect if or not a disc is loaded on the trays 1 to 6.

b)While a disc is inserted using the robber rollers, the disc pushes the insertion completion switch via the arm to sense that a disc is loaded.

## 3.6 Disc Ejection

a)The same operations as the steps a) to e) on "3.1 Disc insertion" are performed.

b)The rubber roller(s) rotate(s) in the direction for disc ejection.

c)When the infrared LED light, which has been interrupted by the disc, passes toward the photo transistors, the rubber rollers stops.

## 3.7 Mechanism Lock

a)Mechanism lock operation is to push the mechanism downward and toward the disc slot in order to keep the mechanism at the correct position during disc insertion/ejection, and to leave the appropriate gap above the mechanism.

b)The Cam gear rotates to move the Mech lock lever toward the rear of the Mechanism. The lever pushes the inside surface of the product. It causes the mechanism to move forward.

c)With the movement of the Mech lock lever, the Mech lock lever (right) moves in a slanting direction as indicated by the arrow in Fig. 25 to push the mechanism forward and downward.

d)The Mech lock lever (left) is driven by the movement of the Mech lock lever via the Mech lock junction lever to push the Mechanism downward.

e)The mechanism lock is released only in the disc clamp mode.

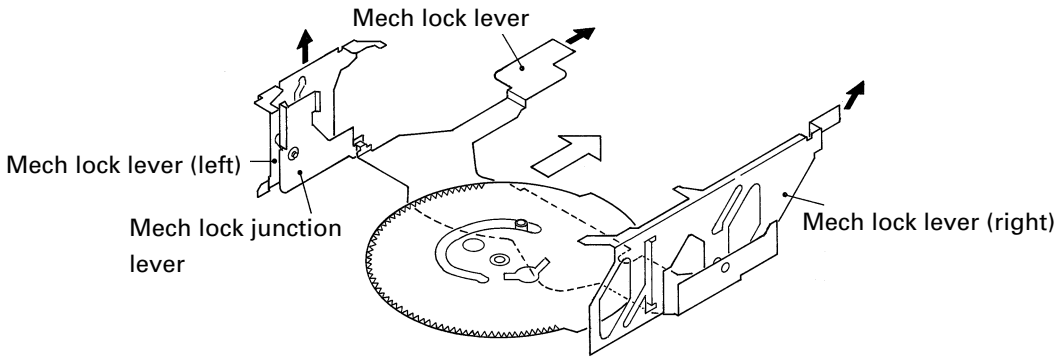



Fig. 25

## 3.8 Door Open

a)The Door open lever pushes the door on the product grille to open it.

b)The Cam gear rotates to move the door arm. Then, the door arm moves the door lever.

c)The door lever moves the door open lever via the buffer spring.

d)When the door switch is turned ON, the Cam gear motor stops rotating.

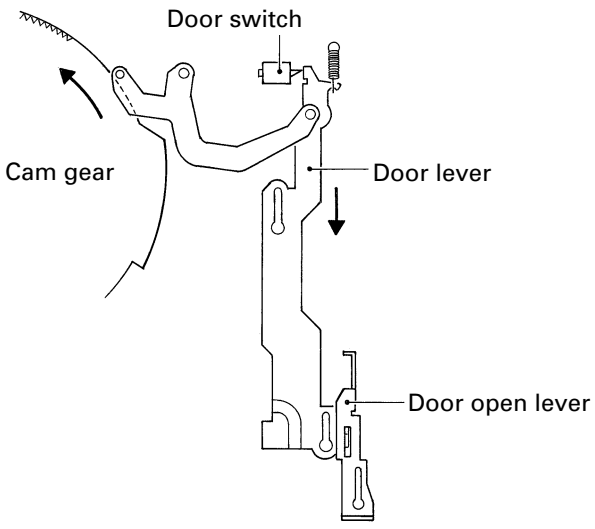



Fig. 26

## 3.9 Stage Mechanism Lock

a)To prevent the Stage mech assy from rattling during disc play, which may adversely affect the vibration-resistant performance, the Stage lock function works only in the disc clamp mode.

b)In the mode described at the step c) on "3.7 Mechanism lock" , the Stage lock lever (right) is driven by the movement of the Mech lock lever (right).

c)The 2 bent portions of the Stage lock lever (right) are pressed against the gear-like portions of the chassis to lock the right side of the Stage mech assy.

d)For the left side of the Stage mech assy, in the mode described at the step d) on "3.7 Mechanism lock", the Mech lock junction lever is driven to move the Stage lock lever (left).

e)The 2 bent portions of the Stage lock lever (left) are pressed against the gear-like portions of the chassis to lock the left side of the Stage mech assy.

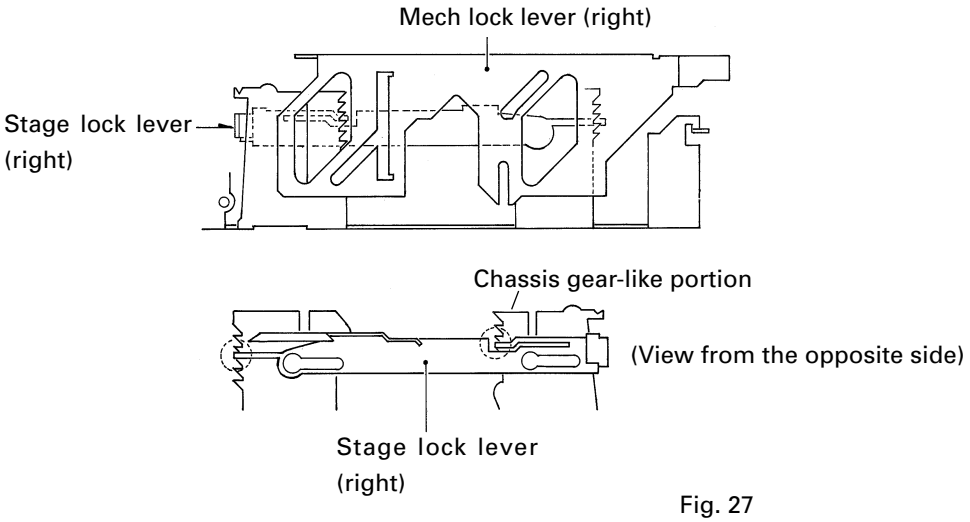

Mech lock lever (right)
Stage lock lever (right)
Chassis gear-like portion
(View from the opposite side)
Stage lock lever (right)

Fig. 27

# 4. DISASSEMBLY

### ● How to remove the Tray Assy

1. Apply about 6V current to the Cam gear motor until all holes match at the position (A) (elevation OK position).
2. Hook the three springs B temporarily as shown in Fig. 28. While pushing the Tray holder lock arms (right and left) in the direction (C), remove the Tray holder.
3. Lift up the Tray assy to remove it.

* Be careful not to remove the Tray hooks from the Tray assy.

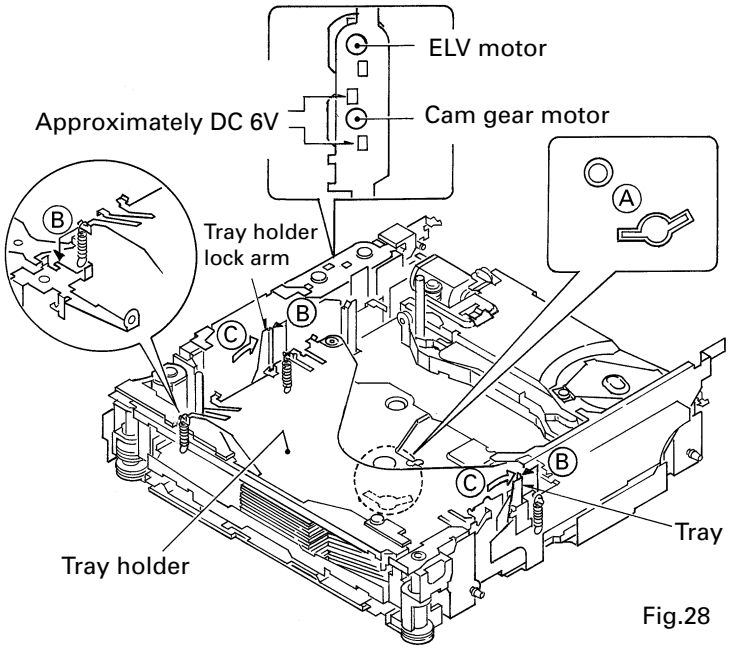



Fig.28

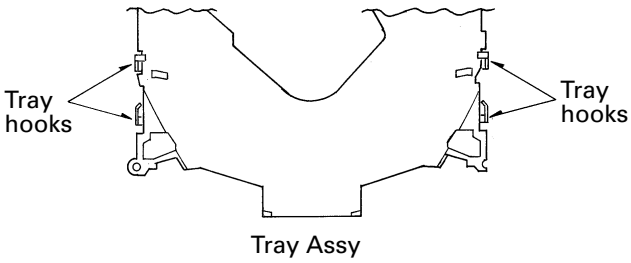



Fig. 29

### ● How to remove the Carriage Mech Assy

1. Insert a short pin into the flexible PCB of the Pickup unit.
2. While opening the resin hooks, remove the cover from the Servo unit.
3. Disconnect the flexible PCBs from the connectors CN101 and CN301.
4. Remove the Tray holder and the Tray assy. (See above)
5. Rotate the Cam gear motor until the positions of all holes (E) match, then stop the motor.
   (The Carriage Mech assy will stop as shown in the Fig.30.)

* When the positions of all holes match, they will be completely covered by the Carriage mech assy.

* To rotate the Cam Gear motor, see "How to remove the Tray assy".

6. Unhook the spring A.
7. Remove the flexible holder B (while opening the hooks).
8. Remove the flexible PCB (C) from the motor. (The flexible PCB (C) has been stuck on the motor with double-sided adhesive tape.)
9. Loosen the fixing screw and remove the flexible holder.

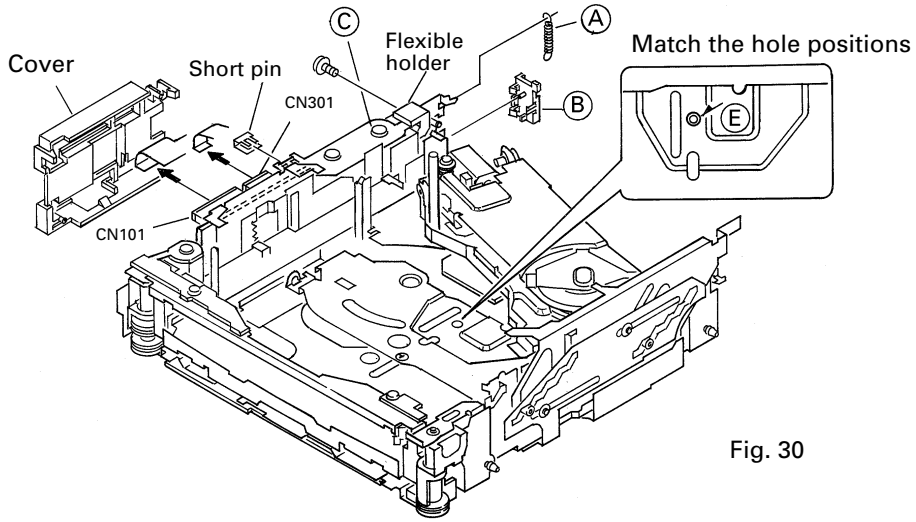



Fig. 30

10. Remove the screw, pressure spring and collar. Lift up the Carriage mech assy to remove it.
    * Screw tightening torque: 2.6kgfcm

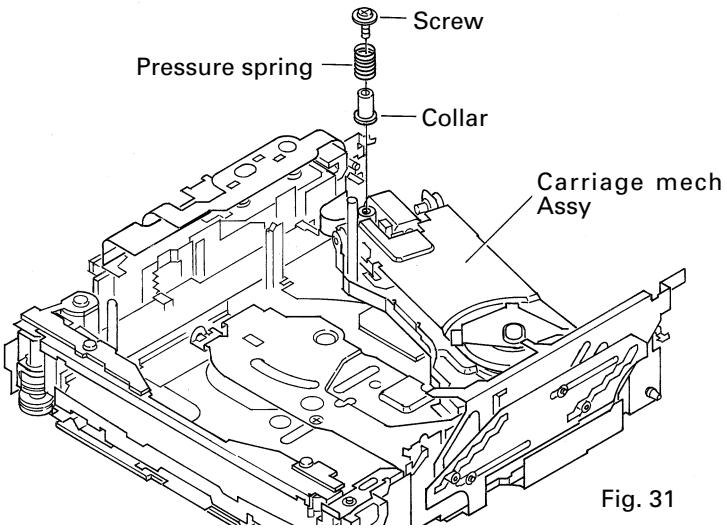



Fig. 31

**● How to remove the Pickup unit**

1. Remove the pulling spring, torsion spring and E-shaped ring. Then remove the Clamper arm.

* The spring (A) will be removed with the Clamper arm.

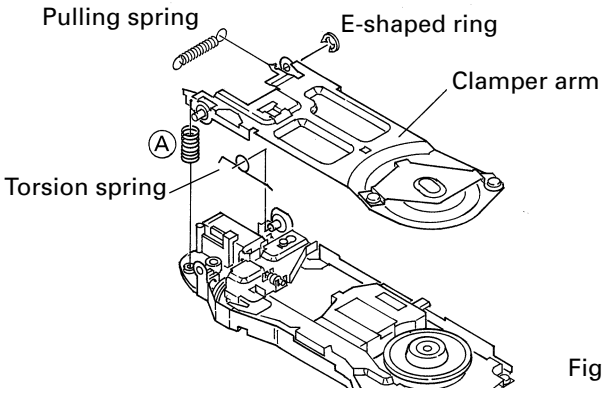



Fig. 32

2. Slide the Clamp UP lever (B) to remove it.
3. Loosen the 2 screws. Remove the feed-screw cover by sliding it.
4. Remove the feed-screw pressure spring (D).
5. Loosen the 2 screws. Remove the feed-screw holder (E).
6. Remove the belt.
7. Remove the Pickup unit together with the feed screw.

* Be careful not to lose the shaft holders at the both ends of the feed screw.

* Be careful not to damage the 2 flexible PCBs(for the Pickup and motor) when separating them. The flexible PCBs have been stuck each other with double-sided adhesive tape.

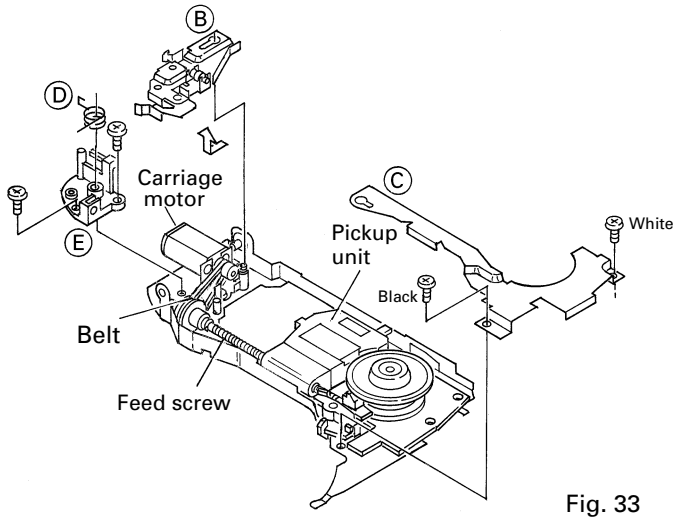



Fig. 33

8. Loosen the 2 screws. Remove the plate spring and the rack.
9. Pull out the feed screw from the Pickup unit.

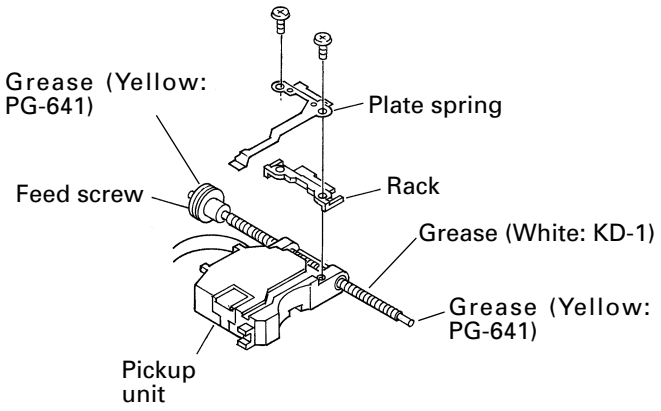



Fig. 34

### ● How to remove the Carriage Motor Assy

1. Loosen the 2 screws (A). Remove the Carriage motor assy.

### ● How to remove the Spindle Motor Assy

1. Remove the connector.
2. Loosen the 2 screws (B). Remove the Spindle motor assy.

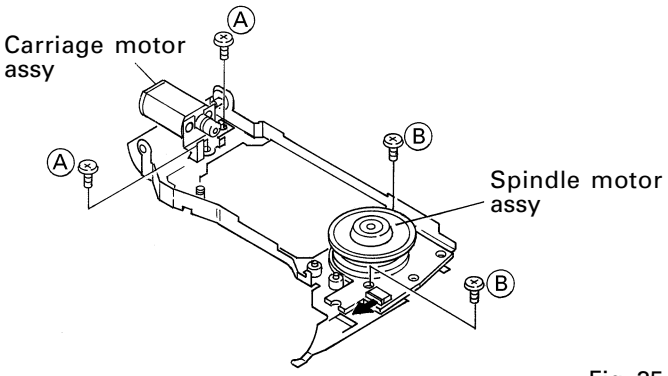



Fig. 35

### ● How to remove the Cam gear motor and ELV motor

1. Insert a short pin into the Pickup flexible PCB. (See Fig. 30)
   Remove the Cover from the Servo unit. (See Fig. 30)
   Disconnect the flexible PCBs from the connectors CN101 and CN301. (See Fig. 30)
2. Disconnect the the flexible PCB (Motor PCB(A)) from the connector CN201 on the Servo unit.
3. Disconnect the flexible PCB from the connector CN801 on the STS unit.
4. Loosen the 2 screws (A). Remove the Servo unit.
5. Loosen the screw (B). Remove the flexible PCB holder.
6. De-solder at the 4 portions (C). Remove the flexible PCB.

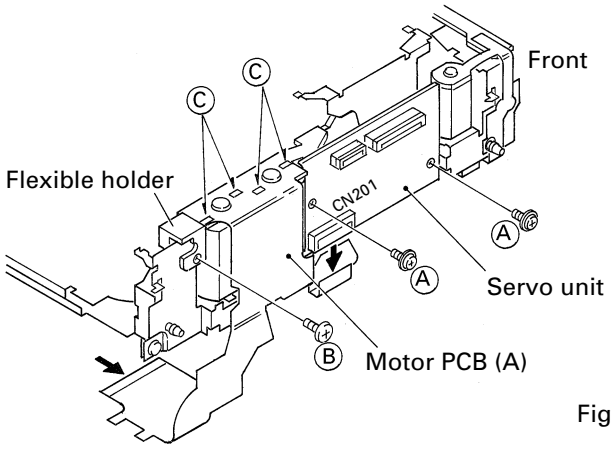



Fig. 36

7. Loosen the 2 screws (D). Remove the Gear cover.
8. Loosen the 3 screws (E). Remove the Motor bracket assy.

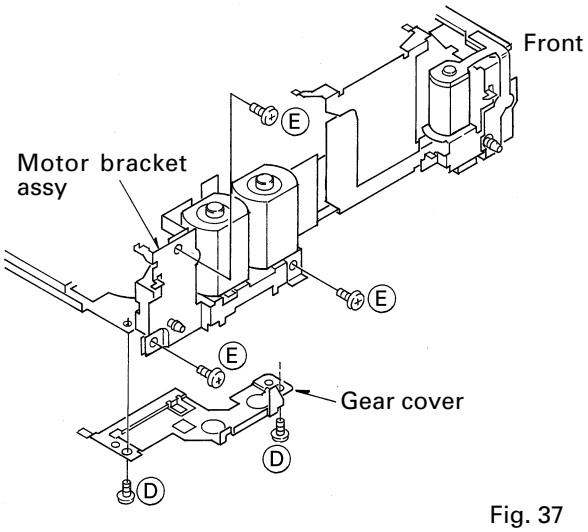



Fig. 37

9. Remove the 5 polyslider washers, then gears and shaft.
10. Loosen the 4 screws. Remove the Cam gear motor and ELV motor.

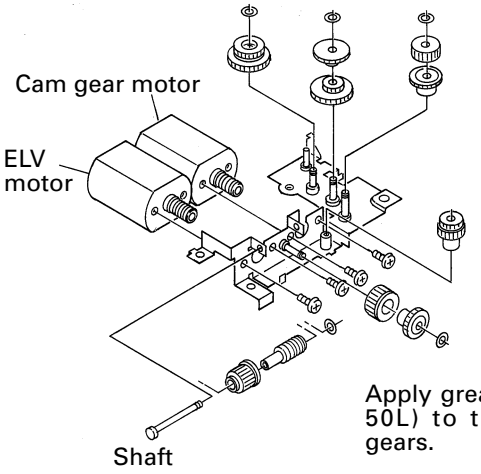



Fig. 38

### ● How to remove the Loading motor

1. Insert a short pin into the flexible PCB of the Pickup unit.(See Fig. 30)
   Remove the Cover from the Servo unit. (See Fig. 30)
   Disconnect the flexible PCBs from the connectors CN101 and CN301. (See Fig. 30)
   Disconnect the the flexible PCB (Motor PCB (A)) from the connector CN201 on the Servo unit. (See Fig. 36)
2. Unhook the spring. Remove the Door open lever.
3. Loosen the 3 screws. Remove the PCB units (C) & (D) and the frame.
4. Remove the spring (A).

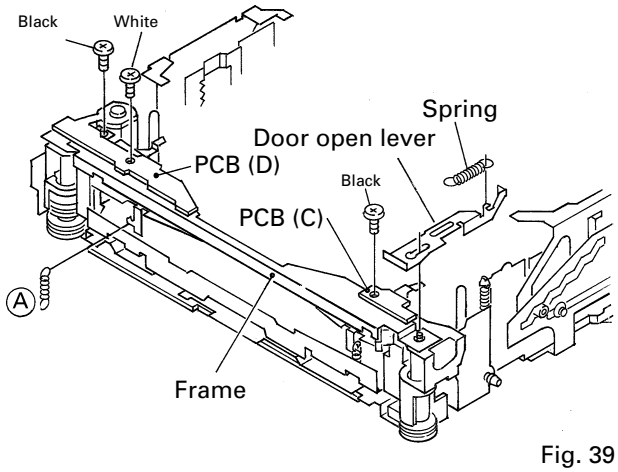



Fig. 39

5. Remove the belt (large).
6. De-solder at the points (B) and (C).
7. Loosen the 2 screws. Remove the Loading motor bracket.
8. Remove the belt (small).
9. Loosen the 2 screws. Remove the Loading motor.

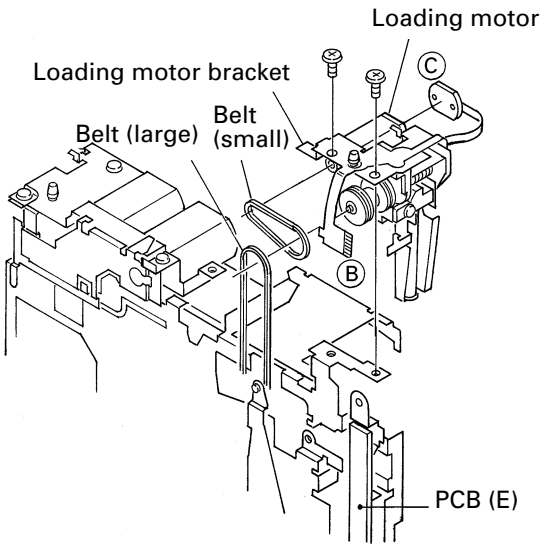



Fig. 40

### ● How to remove the Stage Mech Assy

1. Remove the Tray holder and the Tray assy. (See Fig. 28)
   Remove the Carriage mech assy. (See Fig. 30 and 31)
   Remove the Servo unit. (See Fig. 36)
   Remove the Motor PCB (A). (See Fig. 36)
   Remove the Gear cover. (Fig. 37)
2. Unhook the Spring (C). Remove the Door-open lever.
3. Loosen the screws (D), (E), and (F). Remove the PCB (C) and (D), and the frame.
4. Unhook the springs (A) and (B).
5. Pull out the Load arm assy (right) upward.
6. Unhook the spring (G). Remove the belt (large).
7. Loosen the screw (H). Remove the Load arm assy

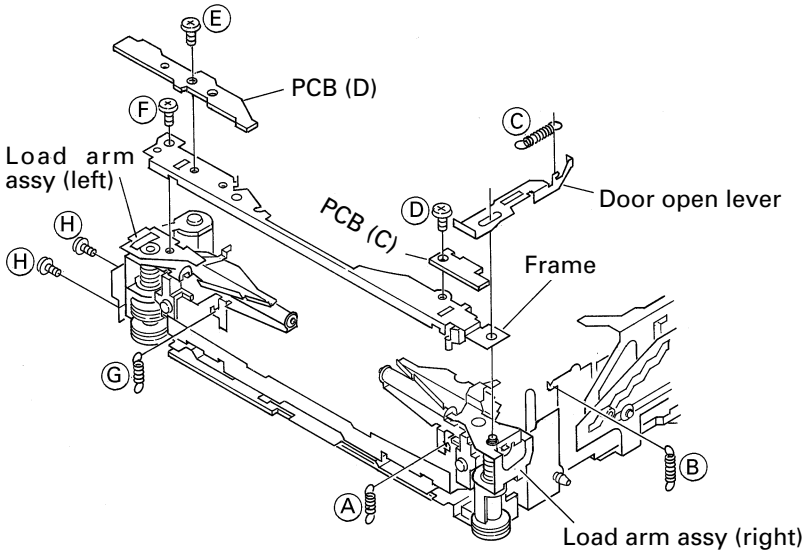



Fig. 41

(left) including the Loading motor.

8. Loosen the 4 screws. Remove the Motor bracket assy and Photo interrupter.

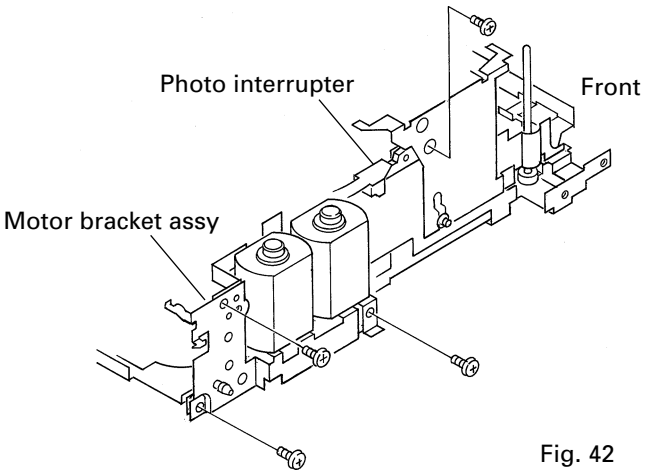



Fig. 42

9. Remove the 4 E-shaped rings (A) and 3 washers (B).
10. Remove the Mech lock lever (left).
11. Remove the 2 rollers (C).
12. Remove the Elevation lever (left). (Pay attention to the mounting direction.)
13. Remove the Mech lock junction lever and and roller (D).

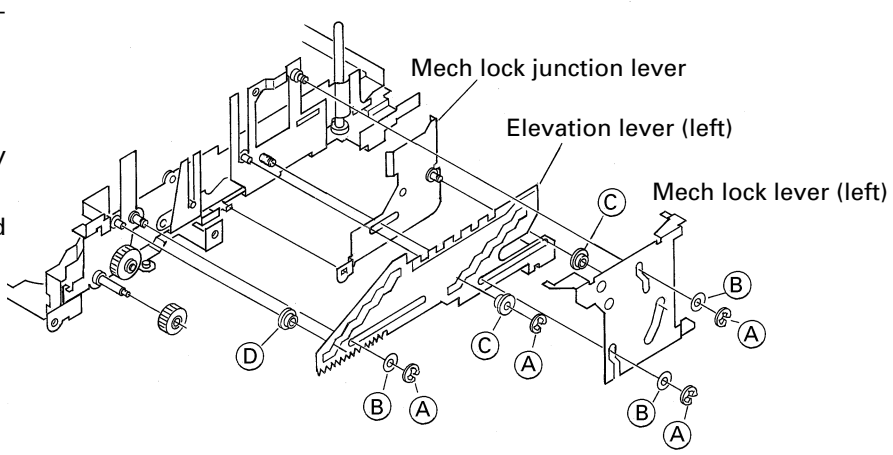



Fig. 43

(Pay attention to the mounting direction.)

14. Remove the 2 E-shaped rings (A) and 2 washers (B).
15. Remove the Elevation lever (right).
16. Remove the 2 rollers (C). (Pay attention to the mounting direction.)
17. Remove the Mech lock lever (right).
18. Lift up the Stage mech assy to remove it.

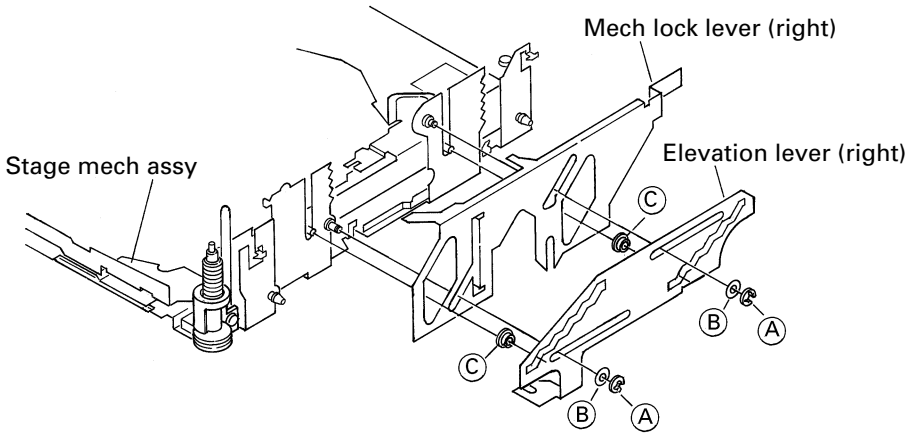



Fig. 44